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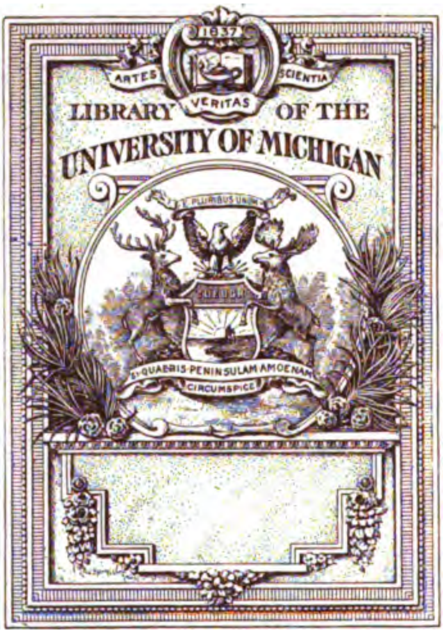
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LEGISLATIVE DOCUMENTS

SUBMITTED TO THE

Nineteenth General Assembly

OF THE

STATE OF IOWA,

WHICH CONVENED AT DES MOINES, JANUARY 9, 1882.

BUREN R. SHERMAN, - - - - - Governor.
ORLANDO H. MANNING, Lieut-Gov. and President of the Senate.
JOHN A. T HULL, - - - - Secretary of State.
WM. V. LUCAS, - - - - - Auditor of State.
EDWIN H. CONGER, - - - - Treasurer of State.
JAMES K. POWERS, - Register of State Land Office.
JOHN W. AKERS, - Superintendent of Public Instruction.
SMITH McPHERSON, - - - Attorney-General.
GEO. R. STRUBLE, - Speaker of the House of Representatives.

VOLUME V.

DES MOINES:
F. M. MILLS, STATE PRINTER.
1882.

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A4. Biennial Report of the Treasurer of State.
A5. Report of the Register of the State Land Office.
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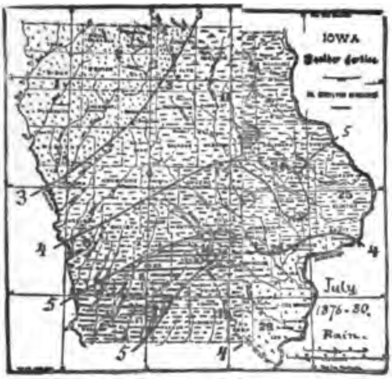
IOWA
Weather Service
Dr. Gustavus Hinrichs
July
1876-80.
Rain.
3
4
5
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5
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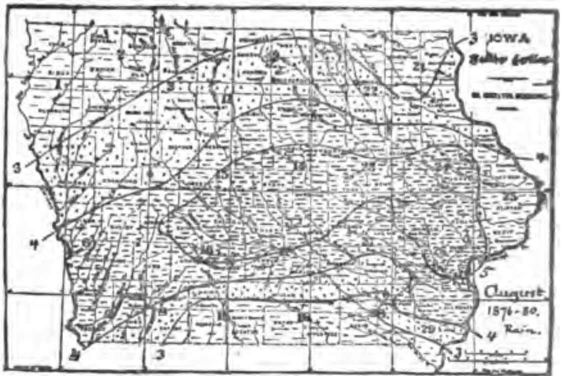
IOWA
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Dr. Gustavus Hinrichs
August
1876-80.
Rain.
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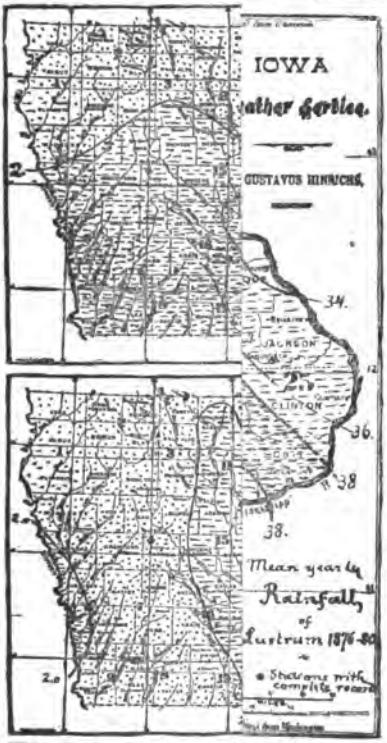
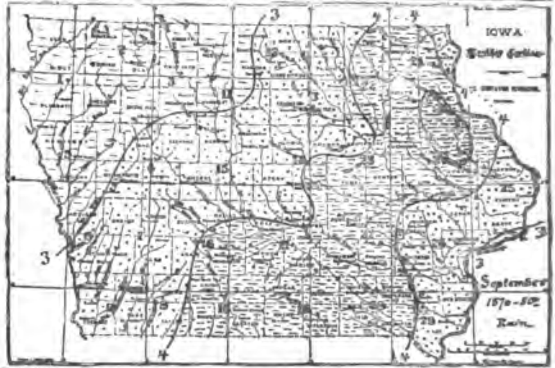

IOWA
Weather Service.
GUSTAVUS HINRICHS
JACKSON
CLINTON
34.
36.
38
38.
2
2.0
2.0
Mean yearly
Rainfall
of
Lustrum 1876-80
Stations with complete record


IOWA
Weather Service
Dr. Gustavus Hinrichs
September
1876-80.
Rain.
3
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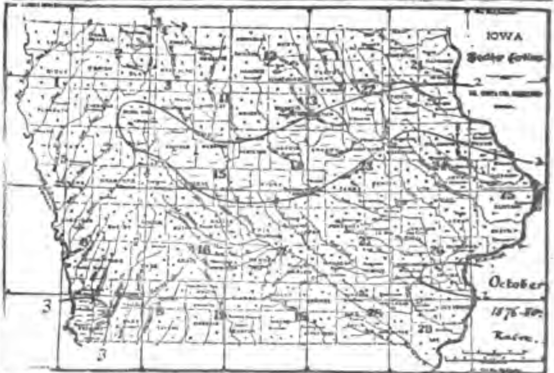
IOWA
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Dr. Gustavus Hinrichs
October
1876-80.
Rain.
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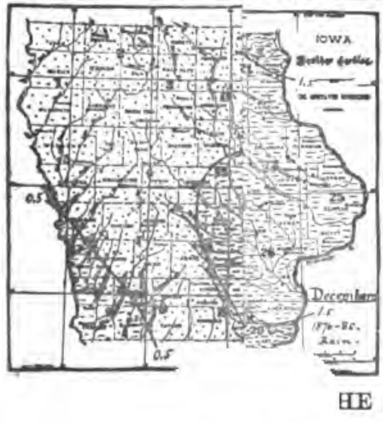
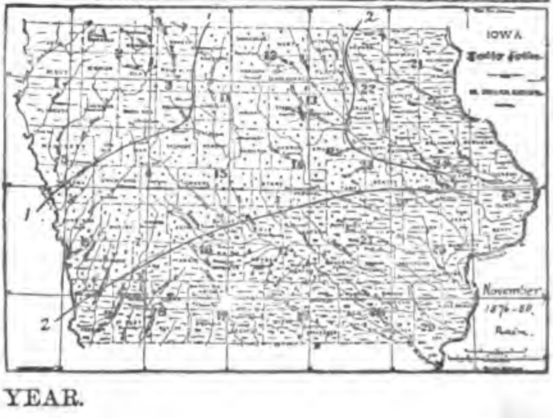

IOWA
Weather Service
Dr. Gustavus Hinrichs
1.5
0.5
0.5
December
1.5
1876-80.
Rain.


IOWA
Weather Service
Dr. Gustavus Hinrichs
November
1876-80.
Rain.
1
1
2
2

HE YEAR.

SECOND BIENNIAL REPORT

OF THE

CENTRAL STATION

OF THE

IOWA WEATHER SERVICE.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

DES MOINES:
F. M. MILLS, STATE PRINTER.
1882.

To His Excellency, JOHN H. GEAR, *Governor of Iowa:*

SIR—I have the honor to submit to you the second biennial report of the Central Station of the Iowa Weather Service.

Very respectfully yours,

GUSTAVUS HINRICHS,
Director Iowa Weather Service.

CENTRAL STATION I. W. S.,
IOWA CITY, IOWA, October, 1881.

To His Excellency, JOHN H. GEAR, *Governor of Iowa:*

SIR—I have the honor to submit to you the second biennial report of the Central Station of the Iowa Weather Service.

Very respectfully yours,

GUSTAVUS HINRICHS,
Director Iowa Weather Service.

CENTRAL STATION I. W. S.,
IOWA CITY, IOWA, October, 1881.

SECOND BIENNIAL REPORT.

The Iowa Weather Service has continued its work without interruption during the two years covered by this report. As the service grows older, the experience of its observers increases, and makes the returns of the stations of higher value. At the Central Station the work becomes more systematized, so as to allow more to be done by the same force. Finally, the first five years of continued and uniform observations having been made, in all parts of this great State, we have for the first time in the history of our State the means of obtaining reliable and sufficiently detailed data for the mean distribution of rain-fall in Iowa. The result of these observations have, at the Central Office, been tabulated and reduced, and will be found further on in this report represented in figures and maps. Great improvement has been made in the monthly Bulletin of the service, and considerable progress has been accomplished in the publication of the final report. While originally not intended, it has yet been possible, from the very limited means at disposal, to furnish the observers at many stations with good instruments. Very much of the increased efficiency of this Service is due to the increased accommodations provided for the Central Station by the building erected in 1879, in which now four rooms are almost exclusively devoted to this Service.

But, above all, the work of the Service depends upon the persons who have, as volunteer observers, taken upon themselves the duty of regular observations, and upon the fact that the Director is as yet physically able to continue the work voluntarily begun. It may, however, be very soon timely to suggest that the volunteer observers should receive appropriate compensation for their labor, whereby still greater efficiency of the work performed would undoubtedly accrue; and as the Director advances in age, he finds it increasingly burdensome to do the great work required, and would be very glad to be enabled to discontinue some of his hard professional work, if the work done by him for this Service were appropriately salaried.

In Missouri, Nebraska, Kansas, and New Jersey, a State Weather Service has been organized similar to our own, and in several other States efforts are being made in the same direction. While serving as a model at home, our Service enjoys the highest consideration abroad.

THE VOLUNTEERS.

Any person who desires to co-operate with the Service, with a view of becoming a volunteer observer, is furnished with directions for non-instrumental observations of sky, wind, and all the meteorological phenomena, and with appropriate blanks for the record of his regular observations, as well as with stamped envelopes for the mailing of his monthly reports to the Central Office.

The regular hours of observation are 8 A. M., noon, and 8 P. M. Of these, the noon observation is obligatory for all who intend to act as observers, while the morning and evening observations are elective. As, however, the record of phenomena is a continuous one, the omission of the stated morning and evening observation is of less importance.

Upon the receipt of the first monthly report from such a person, his name is enrolled as VOLUNTEER on the books of the Service, and especially also on the mailing lists, in virtue of which he will receive one copy of all publications of the Service as they appear.

During this period the volunteer is expected to make himself thoroughly familiar with the observation and proper record of the weather so far as it can be done without instruments. In this regard our Service differs essentially from most others. We earnestly insist upon the great importance of this work, and consider it of higher value than the instrumental work, as it is generally done before such training in the non-instrumental observations has been obtained. For this reason we have generally found new observers, trained in this school of the volunteer, more valuable to the service than old observers who, by the general custom, have thought the mere reading of barometer and thermometer sufficient, while in point of fact these readings are quite frequently without value.

The following is, in brief, an enumeration of the work which each volunteer is to practice. He must, at the stated hours, estimate the amount of cloud in *fifths* of the entire sky, and determine the direction and estimate the force of the wind. He must make a record of these observations on the blanks furnished him for the purpose. In addition, he must keep a general lookout for all notable changes of the weather, as to noted cloud-forms and wind-storms, as well as in regard to all meteorological phenomena, such as rain, snow, hail; dew, frost, silver-thaw, sleet; thunder, lightning, thunder-storms and thunder-bolts; solar and lunar halos and coronæ, rainbows; zodiacal lights, auroræ. He must give time of occurrence of these phenomena and estimate their intensity. He is also expected to give special and full information in regard to effects of wind, hail, and thunder-storms, and to report upon specially noted conditions of streams and rivers. It is finally desirable to furnish a general monthly notice on the condition of the principal crops as dependent on the season, and to note the arrival and leaving of birds, the times of first appearance of leaves and flowers, and ripening of fruits, of some of the principal plants. All these observations are to be recorded at the time when made, so as not to obtain erroneous data. Promptly at the close of each month, the volunteer is expected to make a plainly written, accurate copy of his individual record of observations, partly on the monthly blank-sheet furnished and partly on the note-slips furnished in large number, so that each one can be used for one subject only. His report and the note-slips are to be mailed in one of the stamped and addressed envelopes on the first of each month, in order that the report may be of service at the Central Office in the preparation of the monthly Press Bulletin.

As such a record, if expressed in ordinary language, would necessarily be very bulky, and not only difficult to write but also inconvenient to read rapidly, we have adopted from the start the international meteorological symbols, which are as follows:

● Rain.
⌓ Dew.
≡ Fog.
< Lightning.
♕ Northern Light.
ω Lunar Halo.
TB Thunderbolt.
✱ Snow.
⊔ Hoar Frost.
∞ Haze.
T Thunder.
▲ Zodiacal Light.
ϖ Lunar Corona.
PB Polar Bands.
▲ Hail.
V Silver Thaw.
/ Storm (of Wind).
K Thunder-storm.
○ Solar Halo.
⌒ Rainbow.

If the phenomenon is very faint, a ^{0} follows the symbol. Thus ●^{0}, a slight rain; ω^0, a faint lunar halo.

If the phenomenon is intense, the symbol is followed by ^{2}. Thus ✱^{2}, heavy snow; ♕^{2}, a brilliant aurora.

If the phenomenon was of ordinary intensity, the symbol only is given.

Full definition of each phenomenon has been given in the Report for 1878, on pages 7 to 12, also in the Report for 1879, on pages 5 to 10. In addition, the following rules are to be observed in regard to the notation of time, date, and the counting of the number of days.

Time is local mean time, given in hours and minutes. P. M. is denoted p. A. M. is abbreviated a, according to international rule.

Thus *5.30 a,* stands for 5 hours 30 minutes, A. M.; and 7 h. 29 m. P. M. is written 7.29 p. A *dash* indicates continuance of the phenomenon. Thus ✱ 2–3 p. reads snow-fall from 2 P. M. till 3 P. M. Also ≡ 7a– reads a fog noted at 7 A. M. and continuing, the ending not stated.

To avoid mistakes, the time between noon and 1 P. M. is counted from 0 p. Thus 15 minutes past 12 o'clock, noon, is really 15 minutes past zero, P. M., and should be written 0.15 p. In the same manner the hour from midnight to 1 A. M., will be 0 a; thus 0.45 a, means 45 minutes past midnight.

The *date* is the calendar date, beginning midnight, 0 a of date, and continuing until the following midnight, which is 12 p. of date, or 0 a of next date. A line in the report is exclusively devoted to the date marked at its beginning.

The word *night* should not be used, as it leads to errors in date—when the hour is not well known because too near midnight, the signs a^2 and p^2 are to be used as follows: a^2, *quite early* on date, soon after midnight, and the early morning hours generally; p^2, *quite late* on date, the late hours of evening of date till midnight.

A day is counted a *rain-day* if 0.01 inch, or more of rain-fall (*i. e.,* rain, melted snow, or hail) fell during the twenty-four hours preceding noon of date.

A day is counted *cloudy,* if it averaged 4-5 of overcast in cloudiness; a day is *clear,* if its cloudiness averaged 1-5 of overcast. Days averaging over 1-5 and less than 4-5 in cloudiness, are counted *fair,* but need not be recorded. As in this service, overcast is represented by 5, overcast represents for three daily observations 15 in the sum of cloudiness; hence a day is counted clear if its sum of cloudiness is equal to 3 or less, and it will be counted cloudy if its sum of cloudiness equals or exceeds 12.

At the Central Station, overcast is marked 10; hence, a clear day has a cloudiness of 6 or less, a cloudy day has a cloudiness of 24 or more.

The blank-form used by volunteers is printed below:

IOWA WEATHER SERVICE, ORGANIZED AND DIRECTED BY DR. GUSTAVUS HINRICHS, AT IOWA CITY, IOWA.

Month.............188.. Station.....................

	DATE	SKY.			WIND.			PHENOMENA IN SYMBOLS. Kind, Degree, Time.
		8a	12	8	8 a	12 a	8 p	
FIRST DECADE.	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
SECOND DECADE.	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
THIRD DECADE.	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							
	30							
	31							

					NUMBER OF DAYS.*						NUMBER OF TIMES.									
					Clear	Cloudy	Rain-fall	Snow	Hail	Thun. and Lightning	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	SUMS.
DECADE MEANS	I																			
	II																			
	III																			
Means.																				

*For number of days give *Sums* not Means.

Signed.....................................

Volunteer I. W. S.

It cannot be considered strange that many persons who apply to the Central Office, expressing their willingness to act as observers, decline to act when they learn from our circulars what their duties will be even while only preparing themselves as volunteers for the much more extended and laborious duties of volunteer observer. At the same time, in view of the above given mere outline of the work that is to be done in this service without instruments, it will readily be granted that this work must be essential in all meteorological study, and indeed of greater importance than a mere column of thermometer and barometer readings. When it is considered that these phenomena generally are the least extensive geographically, and also embrace the most seriously destructive ones, we doubt not that all will consider the position invariably held by the Iowa Weather Service to be practically both wise and sound.

The following is the list of the volunteers of the Service at present:

NAME.	POST-OFFICE.	COUNTY.
J. A. Wintermute	Shelby	Shelby.
W. H. Smith, M. D	Shell Rock	Butler.
Ira Brashears	Sanborn	O'Brien.
Julius Riley	Osceola	Clarke.
A. J. Hathaway	Castana	Monona.
George W. Hinckle, M. D	Grainville	Wayne.
Edward Dale	Sibley	Osceola.
Hiram Thomley	Wolfdale	Woodbury.
J. H. McLean	Red Oak	Montgomery.
D. R. Witter	Council Bluffs	Pottawattamie.
E. H. Calkins	Burlington	Des Moines.
Jonathan Thatcher	Keosauqua	Van Buren.
Levi Comingore	Libertyville	Jefferson.
Omar Wilson	Brighton	Washington.
J. S. Williams	Eugene	Ringgold.
C. H. Young	St. Charles	Madison.
Edd. R. Guthrie	Hartford	Warren.
H. G. Griffith, M. D	Burlington	Des Moines.
Miss Edith F. McDill	Afton	Union.
B. F. Garretson	Osceola	Clarke.
Edward Hagemann	Burlington	Des Moines.

The following have also volunteered, but have not yet fulfilled the conditions necessary for enrollment:

NAME.	POST-OFFICE.	COUNTY.
H. J. Davis	Cedar Falls	Black Hawk.
R. P. Speer	Cedar Falls	Black Hawk.
Alexander Peddie	Emmetsburg	Palo Alto.
W. E. Humphreys	Waukee	Dallas.
G. Wernli	Lemars	Plymouth.
H. O. Bates	Millersburg	Iowa.
W. A. Ross	Dexter	Dallas.
J. D. Lockwood	Mapleton	Monona.
H. W. Waterbury	Fayette	Fayette.
J. N. Muncey	Jesup	Buchanan.
John W. Wright	Knoxville	Marion.

THE VOLUNTEER OBSERVERS.

In from four to ten months the volunteer will have sufficiently mastered the details of the work enumerated in the preceding section to be advanced to the rank of a volunteer observer.

Before his desire to be so ranked can be gratified, it is necessary that he should give the Director of the service proper assurances that the Station will be reasonably permanent in his own charge, and he must also promise that he will earnestly try to find and to train a successor if for any reason he should wish to discontinue the observations or remove from the place. Besides it is necessary that the volunteer have trained a member of his family or some reliable neighbor to attend properly to the observations during any temporary absence or disability.

When these conditions have been complied with, the request of the volunteer will be granted, and his name will be enrolled in the list of VOLUNTEER OBSERVERS of the Service.

The duties of the volunteer observer are the same as those of the volunteer, with the addition of regular instrumental observations. These are, in the order of importance and the succession in which they are taken up: measurement of rain-fall and determination of the temperature of the air; thereafter observation of relative humidity, evaporation, and pressure. The instruments required for this purpose are: Rain-gauge, thermometer in shade, wet bulb thermometer, evaporimeter, and barometer. In addition it is recommend to obtain a wind-vane with force plate soon after the rain-gauge.

With the exception of the barometer, which, contrary to general opinion, is the least important instrument in climatological studies, these instruments will be furnished by the service to such volunteer observers as desire not to procure instruments of their own, upon the following conditions:

The volunteer observer must promise to keep the instruments in good order, and hold them subject to recall by the Director in case of continued incomplete report or discontinuance of observations. Furthermore, the instruments are not to be use in behalf of any other meterological service but this State Service. When the volunteer observer shall have completed one lustrum, (five years, beginning on 1 or 6,) and furnished the Central Office the corresponding five, fully reduced, yearly report for each instrumental reading for at least the noon observation, the instrument will be considered the property of the observer, except that it shall not be used in behalf of any other service; in case it be so used, it shall be returned to the Central Station.

While these simple and certainly fair rules govern this part of the work of the Service, it has thus far been impossible to enforce them in all cases, a fact very largely owing to the impossibility of proper inspection of stations, to which reference will be made further on.

It must also be borne in mind that instruments are furnished only so far as the means at disposal allow it, and so far as the returns from the stations prove the observer competent to use the same to advantage. In this regard, plainly and well written reports, accurately summed up, are above all necessary. Finally, the instruments are furnished only in the order stated, namely rain-gauge, thermometer with shade, psychrometer (dry and wet bulb thermometers) with shade, evaporimeter.

The first general distribution of instruments was made in early summer. The following gives a list to date:

THERMOMETER WITH SHADE.

OBSERVER.	STATIONS.	COUNTY.
J. J. Pocock	Lemars	Plymouth.
Fred L. Rice	Spirit Lake	Dickinson.
C. W. Jarvis	Emmet	Emmet.
Sidney Smith	Sac City	Sac.
Caleb Brown	Rose Hill	Mahaska.
Mrs. Melissa Lewis	Hamlin	Audubon.
Geo F. Hard	Atlantic	Cass.
Seth Dean	Glenwood	Mills.
R. R. Hanley	Sidney	Fremont.
J. M. Elder	Concord	Hancock.
Frank E. Landers	Webster City	Hamilton.
C. P. Rogers	Marshalltown	Marshall.
Gregory Marshall	Cresco	Howard.
A. A. Veblen	Decorah	Winneshiek.
C F. Waldron	Brush Creek	Fayette.
Miss Rachel Larrabee	McGregor	Clayton.
Frank H. Carter	Elkader	Clayton.
Gershom H. Hill	Independence	Buchanan.
Geo. Baur	Winterset	Madison.
James O. Crosby	Garnavillo	Clayton.
B. F. Hoyt	Manchester	Delaware.
Joseph Dysart	Dysart	Tama.
Jacob K. Wagner	Blairstown	Benton.
M. M. Moulton	Monticello	Jones.
A. B. Bowen	Maquoketa	Jackson.
Theo. W. Bennett	Crawfordsville	Washington.
Chas Wachsmuth	Burlington	Des Moines.
G. B. Brackett	Denmark	Lee.
Miss Mary Hamilton	Bloomfield	Davis.
Giles C. Morehead	Ida Grove	Ida.
Enoch Lewis	Albion	Marshall.
O. E. Daniels	Hampton	Franklin.
E. T. Preston	Newton	Jasper.
D. Prindale	Fort Dodge	Webster.
Peter Wuest	Homestead	Iowa.
May U. Remley	Anamosa	Jones.

PSYCHROMETERS WITH SHADE (DRY AND WET BULB THERMOMETER.)

OBSERVER.	STATION.	COUNTY.
M. J. Campbell	Sibley	Osceola.
Charles Rice	Smithland	Woodbury.
Edwin Miller	Grant City	Sac.
A. T. Flickinger	Council Bluffs	Pottawattamie.
James Barr	Algona	Kossuth.
Charles Stryker	Creston	Union.
John C. Wright	Clear Lake	Cerro Gordo.
C. E. Bessey	Ames	Story.
Mrs. Martha A. Goddard	Centerville	Appanoose.
Francis H. Robbins	Waukon	Allamakee.
Thomas M. Irish	Dubuque	Dubuque.
Luke Roberts	Clinton	Clinton.
F. M. Witter	Muscatine	Muscatine.
Conrad Schadt	Amana	Iowa.
George D. Clarke	Fairfield	Jefferson.
A. S. Stuver	Newton	Jasper.
Luther P. Fitch	Charles City	Floyd.
Miss Mary Hamilton	Bloomfield	Davis.

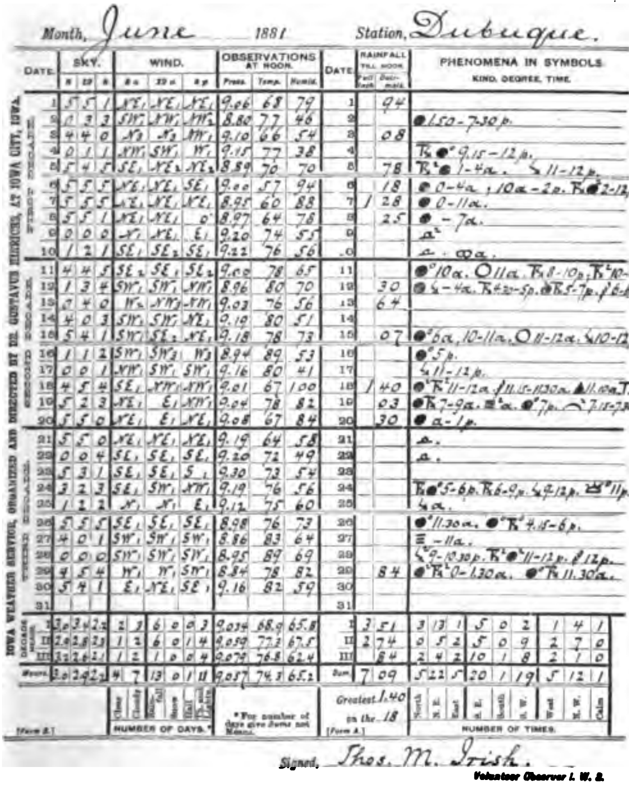
EVAPORIMETERS WITH EXTRA RAIN-COLLECTOR.

OBSERVER.	STATION.	COUNTY.
Miss Anna Hinrichs	Iowa City	Johnson.
A. T. Flickinger	Council Bluffs	Pottawattamie.
C. E. Bessey	Ames	Story.
Francis H. Robbins	Waukon	Allamakee.
Thomas M. Irish	Dubuque	Dubuque.
D. S. Sheldon	Davenport	Scott.
George D. Clarke	Fairfield	Jefferson.
Edwin Miller	Grant City	Sac.

It will readily be understood that the labor of a volunteer observer rapidly increases with the number of instruments he has in charge. For every reading taken must be recorded in his yearly record-book, afterward copied in the monthly report, summed and reduced at least twice, and again copied on the yearly instrumental report.

The *plain* writing of all numbers, and the accurate summing up of columns, cannot too strongly be insisted upon in work of this character. It is very much to be regretted that our schools, as a rule, pay very little attention to this matter, though it is of equal importance in all vocations where records are to be kept. Even where the handwriting is elegant, the reading of the same but too often is difficult or uncertain on account of variable forms of the figures entered, or on account of the flourishes disfiguring the same. It may sound odd to refer to to such a matter here, but when thousands of columns of figures are to be exanined monthly, plain and perfectly distinct form, as well as proper size and the entire absence of flourishes, is of greatest moment. The form of figures printed below in the photo-electrotype of a monthly station report is the one we recommend; it is written by myself, using the Soennecken fluent-writing pen, which almost compels the writer to write plainly, and has the advantage of writing as fast as with pencil and without any pressure whatever, and holding ink sufficient for a monthly column of two places.

The following is the photo-electrotype spoken of, and which serves our observers as a model. It is a reduction to half scale, from my own careful manuscript copy of the observer's report:



Month, June 1881 Station, Dubuque.

IOWA WEATHER SERVICE, ORGANIZED AND DIRECTED BY DR. GUSTAVUS HINRICHS, AT IOWA CITY, IOWA.

Date	Sky. 8	2 p	8	Wind. 8 a	2 p	8 p	Observations at noon. Press.	Temp.	Humid.	Date	Rainfall till noon. Full inch	Decimals	Phenomena in symbols. Kind, degree, time.
FIRST DECADE 1	5	5	1	NE1	NE1	NE1	9.06	68	79	1		94	
2	0	3	3	SW1	NW1	NW2	8.80	77	46	2			● 1.50–7.30 p.
3	4	4	0	N3	N2	NW1	9.10	66	54	3		08	
4	0	1	1	NW1	SW1	W1	9.15	77	38	4			T ●° 9.15–12 p.
5	5	4	5	SE1	NE2	NE2	8.89	70	70	5		78	T² ● 1–4 a. ⚡ 11–12 p.
6	5	5	5	NE1	NE1	SE1	9.00	57	94	6		18	● 0–4 a.; 10 a.–2 p. T ● 2–12 p.
7	5	5	5	NE1	NE1	NE1	8.95	60	88	7	1	28	● 0–11 a.
8	5	5	1	NE1	NE1	0	8.97	64	78	8		25	● –7 a.
9	0	0	0	N1	NE1	E1	9.20	74	55	9			△²
10	1	2	1	SE1	SE2	SE1	9.22	76	56	10			△. ∞ a.
SECOND DECADE 11	4	4	5	SE2	SE1	SE2	9.00	78	65	11			●° 10 a. ○ 11 a. T 8–10 p. T² 10–11 p.
12	1	3	4	SW1	SW1	NW1	8.96	80	70	12		30	● ⚡ –4 a. T 4.20–5 p. ● T 5–7 p. ƒ 6–6.30 p.
13	[illegible]	4	0	W2	NW3	NW1	9.03	76	56	13		64	
14	4	0	3	SW1	SW1	NE1	9.19	80	51	14			
15	5	4	1	SW1	SE2	NE1	9.18	78	73	15		07	●² 6 a., 10–11 a. ○ 11–12 a. ⚡ 10–12 p.
16	1	1	2	SW1	SW3	W3	8.94	89	53	16			●° 5 p.
17	0	0	1	NW1	SW1	SW1	9.16	80	41	17			⚡ 11–12 p.
18	4	5	4	SE1	NW1	NW1	9.01	67	100	18	1	40	●° T² 11–12 a. ƒ 11.15–11.30 a. ▲ 11.10 a. T.B.
19	5	2	3	NE1	E1	NW1	9.04	78	82	19		03	● T 7–9 a. ≡² a. ●° 7 p. ⌒² 7.15–7.30 p.
20	5	5	0	NE1	E1	NE1	9.08	67	84	20		30	● a.–1 p.
THIRD DECADE 21	5	5	0	NE1	NE1	NE1	9.19	64	58	21			△.
22	0	0	4	SE1	SE1	SE1	9.20	72	49	22			△.
23	5	3	1	SE1	SE1	S1	9.30	73	54	23			
24	3	2	3	SE1	SW1	NW1	9.19	76	56	24			T ●° 5–6 p. T 6–9 p. ⚡ 9–12 p. ♕° 11 p.
25	1	2	2	N1	N1	E1	9.12	75	60	25			⚡ a.
26	5	5	5	SE1	SE1	SE1	8.98	76	73	26			●° 11.30 a. ●° T² 4.15–6 p.
27	4	0	1	SW1	SW1	SW1	8.86	83	64	27			≡ –11 a.
28	0	0	0	SW1	SW1	SW1	8.95	89	69	28			⚡° 9–10.30 p. T² ●² 11–12 p. ƒ 12 p.
29	4	5	4	W1	W1	SW1	8.84	78	82	29		84	●° T² 0–1.30 a. ●° T 11.30 a.
30	5	4	1	E1	NE1	SE1	9.16	82	59	30			
31										31			

Decade means	Sky 8	2 p	8	Clear	Cloudy	Rain-fall	Snow	Hail	[illegible]	Press.	Temp.	Humid.	Decade	Full inch	Decimals	North	N.E.	East	S.E.	South	S.W.	West	N.W.	Calm
I	3.0	3.4	2.2	2	3	6	0	0	3	9.034	68.9	65.8	I	3	51	3	13	1	5	0	2	1	4	1
II	2.9	2.8	2.3	1	2	6	0	1	4	9.059	77.3	67.5	II	2	74	0	5	2	5	0	9	2	7	0
III	3.2	2.6	2.1	1	2	1	0	0	4	9.079	76.8	62.4	III		84	2	4	2	10	1	8	2	1	0
Means	3.0	2.9	2.2	4	7	13	0	1	11	9.057	74.3	65.2	Sum	7	09	5	22	5	20	1	19	5	12	1

[Form B.] NUMBER OF DAYS.* *For number of days give Sums not Means. Greatest 1.40 on the 18 [Form A.] NUMBER OF TIMES.

Signed, Thos. M. Irish.
Volunteer Observer I. W. S.

In addition to the observations recorded on this blank, many volunteer observers also fill the blank "Form C" printed below; in the last column evaporation is generally entered. Finally, some observers also use the "Form D," similar to "C," for the record of maximum and minimum temperatures.

Month,........................ 188...... *Station,*................................

IOWA WEATHER SERVICE, ORGANIZED AND DIRECTED BY DR. GUSTAVUS HINRICHS, AT IOWA CITY, IOWA.

	DATE.	OBSERVATIONS AT 8 A. M.			OBSERVATIONS AT 8 P. M.			
		Press.	*Temp.*	*Humid.*	*Press.*	*Temp.*	*Humid.*	
FIRST DECADE.	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
SECOND DECADE.	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
THIRD DECADE.	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							
	30							
	31							
DECADE MEANS.	I							
	II							
	III							
MONTHLY MEANS.	*8 A.*							
	8 P.							
	Mon							

Form C.]

Signed,..

Volunteer Observer I. W. S.

It will also be seen that if the volunteer observer makes observations filling the Forms "A," "B" [see photo-electrotype copy], "C" and "D," and in addition sends a number of "Note Slips," with special verbal notes on more important phenomena, as indicated for volunteers, his entire monthly report is the result of much labor, and gives data of great permanent value. It will also be readily admitted that the filing, copying, recording and studying of a number of such reports, which has to be done by the Director during the first week of each month, is a work of great magnitude.

PENTADE STATIONS.

In order to enable the Director to follow the course of the weather throughout the State more closely than monthly reports will allow, he has selected twelve stations, the volunteer observers at which furnish him, on postal card blanks, a report for each five days of each month; namely, for the 1 to 5, 6 to 10, 11 to 15, 16 to 20, 21 to 25, and 26 to close of month. This makes seventy-six pentade reports per month. The following is the blank form used for the fifth pentade. The others differ only in the printed dates.

*Month of*____________________, *1881.*

Date	SKY.			WIND.			AT NOON.				PHENOMENA.
	8	12	8	8a	12a	8p	Press	Temp	Humid	Rain	Kind, Degree, Time.
21											
22											
23											
24											
25											

Description of Phenomena.

These pentade card reports are furnished by the pentade station observers *in addition to* their full monthly reports. The following is the list of these observers, which, by removal from the State, by protracted sickness, by death, and by other causes, has changed somewhat in time.

PENTADE STATIONS.

During Last Months of 1879, until September, 1880.

No.	STATION.	OBSERVER.	REMARKS.
1	Sibley	M. J. Campbell	
2	Smithland	Charles Rice	
3	Council Bluffs	A. T. Flickinger	
4	Fort Dodge	Solon D. Prindle	
5	Earlham	Abijah Johnson	
6	Nashua	William Perrin	
7	Newton	A. S. Stuver	
8	Centerville	Thomas M. Goddard	
9	Waukon	Francis H. Robbins	
10	Amana	Conrad Schade	
11	Mt. Pleasant	Hiram M. Bassett	
12	Dubuque	Thomas M. Irish	
13	Davenport	D. S. Sheldon	

PENTADE STATIONS SINCE SEPTEMBER, 1880.

No.	STATION.	OBSERVER.	DIVISION OF STATE.
1	Sibley	M. J. Campbell	Western Iowa.
2	Smithland	Charles Rice, M. D	Western Iowa.
3	Atlantic	George F. Hard	Western Iowa.
4	Algona	James Barr, M. D	Northern Iowa.
5	Charles City	Luther P. Fitch, M. D	Northern Iowa.
6	Waukon	Francis H. Robbins	Northern Iowa.
7	Newton	A. S. Stuver	Middle Iowa.
8	Amana	Conrad Schade	Middle Iowa.
9	Dubuque	Thomas M. Irish	Middle Iowa.
10	Centerville	Mrs. Martha F. Goddard	Southern Iowa.
11	Mt. Pleasant	Hiram M. Bassett, M. D	Southern Iowa.
12	Davenport	D. S. Sheldon	Southern Iowa.

As Station 2, Grant City, Edwin Miller, V. O., served from May to August, 1881, while observer at Smithland was in New York. Station Osage, Professor George D. Pettingill, has been taken as No. 5 since January, 1881, because it was impossible for Dr. Fitch to find the time necessary for making these numerous additional reports; namely, seventy-two per year.

These pentade reports are printed in full in the report of the Service, by dates.

The following is a list of the volunteer observers who have been doing duty during the past two years. The names printed in capitals mark observers having completed one lustrum of observations:

VOLUNTEER OBSERVERS.

NAME.	STATION.	COUNTY.
Guy P. Arnold	Garden Grove	Decatur.
JAMES BARR, M. D.	ALGONA	Kossuth.
Hiram M. Bassett, M. D.	MT. PLEASANT	Henry.
Geo. Baur	Winterset	Madison.
A. H. Beales	Waverly	Bremer.
Theo. W. Bennett, M. D.	CRAWFORDSVILLE	Washington.
C. E. Bessey, Prof.	Ames	Story.
A. B. BOWEN, M. D.	MAQUOKETA	Jackson.
Col. Gust. B. Brackett	Denmark	Lee.
Caleb Brown, M. D.	Rose Hill	Mahaska.
A. D. Bundy, M. D.	St. Ansgar	Mitchell.
M. J. Campbell	Sibley	Osceola.
Robt. M. Carothers	Vinton	Benton.
Frank H. Carter	Elkader	Clayton.
E. W. Clarke, M. D.	Grinnell	Poweshiek.
GEO. D. CLARKE	FAIRFIELD	Jefferson.
Alonzo Collin, Prof.	Mt. Vernon	Linn.
Henry H. Colt	Nora Springs	Floyd.
Geo. H. Couch	GRAND JUNCTION	Greene.
James O. Crosby	Garnavillo	Clayton.
D. W. CROUSE, M. D.	WATERLOO	Black Hawk.
O. E. Daniels	Hampton	Franklin.
Seth Dean	Glenwood	Mills.
Joseph Dysart	Dysart	Tama.
J. M. Elder	Concord	Hancock.
LUTHER P. FITCH, M. D.	Charles City	Floyd.
Frank A. Fletcher*	Iowa City	Johnson.
A. T. Flickinger	Council Bluffs	Pottawattamie.
Chas. H. Goddard	Swan Lake	Turner Co., D. T.
Mrs. Martha F. Goddard	Centerville	Appahoose.
H. L. Grant	Waverly	Bremer.
Jas. E. Gray	Columbus City	Louisa.
Miss Mary Hamilton	Bloomfield	Davis.
Richard H. Hanley M. D.	Sidney	Fremont.
Geo. F. Hard	Atlantic	Cass.
James Harkness	Hesper	Winneshiek.
Wm. H. Helmick	Columbus City	Louisa.
Gershom H. Hill, M. D.	INDEPENDENCE	Buchanan.
T. H. Hollister	Eldora	Hardin.
CURTIS HAUGHTON	BROOKVILLE	Jefferson.
Brooks F. Hoyt, B. Ph.	Manchester	Delaware.
H. C. HUNTSMAN, M. D.	OSKALOOSA	Mahaska.
MISS ANNA HINRICHS	IOWA CITY	Johnson.
G. R. Irish	Iowa City	Johnson.
THOS. M. IRISH, PROF.	DUBUQUE	Dubuque.
C. W. Jarvis	Emmet and Swan Lake	Emmet.
Jos. E. Jones	Stellapolis	Iowa.
Abijah Johnson, M. D.	EARLHAM	Madison.
Henry W. Knight	Nashua	Chickasaw.
Frank E. Landers	Webster City	Hamilton.
MISS AUGUSTA LARRABEE	CLERMONT	Fayette.
MISS RACHEL LARRABEE	MCGREGOR	Clayton.

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*Reads the River Gauge daily, from the Centennial Bridge over the Iowa River, west of Iowa City.

VOLUNTEER OBSERVERS—CONTINUED.

NAME.	STATION.	COUNTY.
ENOCH LEWIS, M. D.	ALBION	Marshall.
Mrs. Melissa Lewis	Hamlin	Audubon.
Theodore Marks	Hopkinton	Delaware.
GREGORY MARSHALL	CRESCO	Howard.
EDWIN MILLER	GRANT CITY	Sac.
S. C. Mitchell	Leon	Decatur.
L. S. Mitchell	Brush Creek	Fayette.
Giles C. Moorehead, M. D.	Ida Grove	Ida.
M. M. MOULTON	Monticello	Jones.
C. Narvesen, Prof	Decorah	Winneshiek.
Geo. D. Pettingill, Prof.	Osage	Mitchell.
C. G. Perkins	Onawa	Monona.
Chas. H. Philpott	New London	Henry.
J. J. Pocock	Lemars	Plymouth.
E. S. PRESTON	NEWTON (near)	Jasper.
D. Prindle	FORT DODGE	Webster.
SOLON D. PRINDLE	FORT DODGE	Webster.
MRS. MAY U. REMLEY	ANAMOSA	Jones.
J. W. Replogle	Hampton	Franklin.
F. Reppert	Muscatine	Muscatine.
Thos. Rigg, M. D	TIPTON	Cedar.
Chas. Rice, M. D	Smithland	Woodbury.
Fred. L. Rice	Spirit Lake	Dickinson.
FRANCIS H. ROBBINS	WAUKON	Allamakee.
Luke Roberts	Clinton	Clinton.
C. P. Rogers, PROF	Marshalltown	Marshall.
J. F. Sanborn	Tabor	Fremont.
CONRAD SCHADT	AMANA	Iowa.
D. S. SMELDON, Prof.	DAVENPORT	Scott.
SIDNEY SMITH	SAC CITY	Sac.
T. V. Smith	Farley	Dubuque.
Jacob F. Stern	Logan	Harrison.
CHAS. S. STRYKER.	CRESTON	Union.
A. S. Stuver	Newton	Jasper.
Andrew A. Veblen, Prof	Decorah	Winneshiek.
CHAS. WACHSMUTH	BURLINGTON	Des Moines.
JACOB K. WAGNER, M. D.	Blairstown	Benton.
C. F. Waldron, M. D	Brush Creek	Fayette.
Wm. Ward	Wesley	Kossuth.
C. L. Watrous	Des Moines	Polk.
Chas. L. Werner	South Amana	Iowa.
G. Z. Whitey	Hampton	Franklin.
James S. Whittaker	Corydon	Wayne.
F. M. WITTER, PROF	MUSCATINE	Muscatine.
Geo. H. Wright	Sioux City	Woodbury.
John C. Wright, M. D	Clear Lake	Cerro Gordo.
Peter Wuest	Homestead	Iowa.

Volunteer observers having furnished full reports of rain-fall for an entire lustrum in this service, from 1876 to 1880, inclusive, so that the mean rain-fall of their station can be determined, are distinguished in the above list by having their name and that of the station printed in CAPITALS. If at any station the observers changed, but the results of the station are complete, the name of the station only is printed in capitals.

From the above list the service has lost by death SOLON D. PRINDLE and JAMES HARKNESS. Brief biographies of these very faithful and efficient observers were published in the *Iowa Weather Bulletin* for September, 1880. Several observers have removed from the State; so notably, Dr. Johnson, of Earlham, who removed to Colorado; Superintendent H. L. Grant, of Waverly, who removed to Peoria, Illinois; and Professor A. A. Veblen, of Decorah, who removed to Minnesota.

It is difficult to outsiders to conceive how much the work at this office is increased by tardiness of report, and by neglect of observers to train competent successors before they leave the service. May the Director express the hope that both these causes will gradually diminish in magnitude, as the work of the Service becomes better understood.

I cannot close this list of observers without giving expression to the fact that the volunteer observers, have done valuable work for our State in furnishing reliable data to the climatological history of the same.

CROP REPORTERS.

During the year 1880 regular crop reports were received, and the results published in the monthly Press Bulletins of the Service. These reports were the first regular monthly crop reports ever obtained from independent sources in Iowa. They would have been continued in 1881, but for the fact that the Agricultural Society appropriated money* for this purpose, and thus relieved us of this great extra labor. The society has been able to secure many more reporters, but the scale has been different, and no report for divisions of the State have thus far been issued; but the State has been summed as a whole. It is, therefore, impossible to compare the condition of the crops with the principal determining cause, the condition of the weather in a given territory.

The following are the directions under which our crop reporters have done their work:

"The crop reporter will, during the growing season, watch the progress of each crop in his township, and in neighboring townships, so far as possible. He will be doubly attentive toward the close of each month, so as to be able to express a pretty well-founded estimate on the condition of each crop as compared to the general average condition of the same crop in the same neighborhood for the past years. If the crop is about equal to this normal or standard condition, not differing more than five per cent either way, enter the word *good* opposite the name of the crop. If, however, the crop appears to be about ten per cent *above* the average season, write the words *very good* opposite the name of that crop; use the same words when your estimate runs from six to twelve per cent above average or good. If the crop be as much short of average, call it *fair* in the report. A crop which is about one-sixth above—that is, from thirteen to twenty per cent high—is reported *excellent;* if as far below average, it is marked *poor.* If a crop appears throughout the neighborhood over twenty per cent above its average condition for the season, it may be marked *abundant;* if over twenty per cent below average the crop should be reported as follows:

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*This appropriation is, I understand, $600. The total appropriation for our weather service is only $1,000 per annum.

"*Very poor*, if only three-fourths to two-thirds of an average crop; *partial failure*, if only about half an average crop; and *failure*, if only about one-fourth of an average crop is apparent.

"Each reporter must make up his mind for himself, as to which one of these words will most properly apply to each given crop reported by him; he should then simply enter this particular *word,* plainly written, without any kind of verbal addition or explanation. If the crop reporter, being experienced and on the ground, cannot choose the proper word, it will be impossible to do so for him here. The proper estimation or valuation of the crop rests necessarily *entirely* upon him.

"The following table may serve for ready reference. A crop is reported—

"*Abundant*, if it is *over* one-fifth above average.

"*Excellent*, if it is about one-seventh above average.

"*Very good*, if it is about one-tenth above average.

"*Good*, if it is about equal to average.

"*Fair*, if it is about one-tenth *below* average.

"*Poor*, if it is about one-fifth *below* average.

"*Very poor*, if it is from one-fourth to one-third *below* average.

"*Partial failure*, if it is only about half an average.

"*Failure*, if it is only about one-fourth of an average crop.

"REMARKS.—In the blanks for remarks, enter briefly, in plain and legible handwriting, any additional notes on the crops, and special effects of weather and insects on the same—first giving favorable, then unfavorable, influences, if any noted. Be as brief and clear as if writing a telegram.

"In giving the condition of the fruits, use the same scale of words, and name the fruits of the season reported.

"The crop reporter should invariably *sign* his name to his report, for without this signature it will be impossible to tell where the report came from; the number stamped at the top of the card, after the word "from," indicates merely the county. Also, invariably write the name of the MONTH *for noon of the last day of which the report is drawn up.*

"It is exceedingly important that the report should be *received* by me on or before the third of each following month; hence, it should be mailed *on* the last day of the month, if possible.

"Crop Reporters of the Iowa Weather Service receive the Monthly Bulletin of the Service free; if they receive this Bulletin already, in any other capacity than as crop reporters, the Bulletin will be sent to any address given at the time of volunteering. We cannot change the address afterward.

"A small supply of extra postal cards is furnished for additional reports, notes of storms, and other meteorological phenomena; I shall also be pleased to receive more extended information by letter. It is hoped that crop reporters will take a pride in being prompt, and will aid in developing the Service by interesting additional crop reporters and observers.

"The condition of the crops at any time is, to a very large extent, a measure of the *sum* of the atmospheric conditions of the current growing season. For this reason, we have volunteered to conduct this work until the State shall have made proper special provisions for the same.

"The following report, transcribed from an actual report of last year, may serve as an example to new crop reporters:

I. W. S. CROP REPORT 19-1

From Union county on the last day of July, 1879.

SCALE IN WORDS.	CROP.	CONDITION.
Abundant.	Corn	Very good.
Excellent.	Winter wheat	
Very good.	Spring wheat	Fair.
Good.	Oats	Poor.
Fair.	Hay	Fair.
Poor.	Pasture	Poor.
Very poor.		
Partial failure.		
Failure.		
As defined in the directions.		

REMARKS.—Dry; good for putting up hay and grain; too dry for grass and corn. Wind-storm of 28th blew down corn. Corn worms in roots doing damage.

Fruit: ....

Signed:

CHAS. S. STRIKER, *Crop Reporter, I. W. S.*

We expect to publish a few of our crop maps of Iowa for comparison with the weather maps.

The following is the list of crop reporters who have served during the year 1880:

LIST OF CROP REPORTERS.

NAME.	POST-OFFICE.	COUNTY.
J. A. Alexander	Crawfordsville	Washington.
G. A. Appelman	Clermont	Fayette.
P. T. Bailey	Sibley	Osceola.
Geo. Baur	Winterset	Madison.
F. F. Beebe	Beebetown	Harrison.
C. E. Bessey	Ames	Story.
D. A. Blanchard	Lewisburg	Wayne.
Caleb Brown	Rose Hill	Mahaska.
David F. Bruner	Toledo	Tama.
Wm. Bowman	Maquoketa	Jackson.
W. K. Bowman	Waverly	Bremer.
W. H. Brainerd	Grinnell	Poweshiek.
A. A. Buckman	Harlan	Shelby.
A. D. Bundy	St. Ansgar	Mitchell.
J. E. L. Carey	Tipton	Cedar.
E. B. Chase	Algona	Kossuth.
P. B. Clark	Tabor	Fremont.
Henry H. Colt	Nora Springs	Floyd.
Geo. H. Couch	Grand Junction	Greene.
B. F. Clayton	Macedonia	Pottawattamie.
Seth Dean	Glenwood	Mills.
Eli E. Dotson	Colfax	Jasper.
Joseph Dysart	Dysart	Tama.
J. M. Elder	Concord	Hancock.
Thos. J. Evans	Stellapolis	Iowa.
S. A. French	Faulkner	Franklin.
M. B. Frisbie	Walnut	Pottawattamie.
J. E. Gray	Columbus City	Louisa.
W. F. Hadley	Winterset	Madison.
W. J. Hammond	Guthrie Center	Guthrie.
J. J. Hamilton	Bloomfield	Davis.
Ed. Hartsock	Clarion	Wright.
A. J. Hathaway	Castana	Monona.
Geo. Hayes	Clear Lake	Cerro Gordo.
Gershom H. Hill	Independence	Buchanan.
Adam Hirn	Amana	Iowa.
B. F. Hoyt	Manchester	Delaware.
James Hughes	Centerville	Appanoose.
R. W. Humphrey	Charles City	Floyd.
M. L. Ink	Mt. Vernon	Linn.
G. R. Irish	Iowa City	Johnson.
C. W. Jarvis	Emmet	Emmet.
W. W. Jones	Alden	Hardin.
J. R. Kenyon	New Hampton	Chickasaw.
Frank Landers	Webster City	Hamilton.
Frank Larrabee	McGregor	Clayton.
Chas. W. Law	Davenport	Scott.

CROP REPORTERS—CONTINUED.

NAME.	POST-OFFICE.	COUNTY.
J. W. Leake	Clinton	Clinton.
Mrs. Melissa Lewis	Hamlin	Audubon.
B. S. Lauthan	Toledo	Tama.
A. T. McCargar	Spencer	Clay.
R. McColman	Maple Grove	Madison.
Robert W. McGee	Ida Grove	Ida.
S. P. McNeill	Garden Grove	Decatur.
Samuel McNutt	Muscatine	Muscatine.
Theodore Marks	Hopkinton	Delaware.
Gregory Marshall	Cresco	Howard.
J. Merchant	Atlantic	Cass.
M. H. Merrill	Decorah	Winneshiek.
Edwin Miller	Grant City	Sac.
N. F. Miller	Knoxville	Marion.
S. C. Mitchell	Leon	Decatur.
D. M. Moniger	Albion	Marshall.
B. Moore	New York	Wayne.
H. J. Moore	Newell	Buena Vista.
O. A. Moore	Lemars	Plymouth.
M. M. Moulton	Monticello	Jones.
Theo. W. Parker	Des Moines	Polk.
G. D. Pattengill	Osage	Mitchell.
Charles Paulk	Waukon	Allamakee.
J. A. Perkins	Cedar Rapids	Linn.
William Perrin	Nashua	Chickasaw.
S. H. Pettibone	Algona	Kossuth.
C. H. Philpot	New London	Henry.
C. C. Platter	Red Oak	Montgomery.
George Rae	Dow City	Crawford.
Ransom Brothers	Farley	Dubuque.
Julius Riley	Osceola	Clarke.
S. G. Rogers	Logan	Harrison.
Lysander S. Sackett	Garnavillo	Clayton.
John Sax	Primrose	Lee.
A. B. Scott	Fairfield	Jefferson.
L. W. Scott	Hesper	Winneshiek.
E. H. Smith	Dubuque	Dubuque.
Sidney Smith	Sac City	Sac.
W. G. Smith	Lamoiville	Marshall.
David Stanton	Earlham	Madison.
T. E. Stevens	Mt. Pleasant	Henry.
S. Stewart	Oakley	Lucas.
Jesse K. Strawbridge	Iowa City	Johnson.
W. Sutherland	Estherville	Emmet.
C. S. Striker	Creston	Union.
Thomas S. Taylor	Denmark	Lee.
Hiram Thornley	Wolfdale	Woodbury.
F. A. Tiedemann	Pleasant Grove	Des Moines.
A. P. Walker	Solon	Johnson.
J. W. Wallace	Hampton	Franklin.
L. W. Waugh	Spirit Lake	Dickinson.
A. J. Westbrook	Newton	Jasper.
C. Whittemore	Kniffin	Wayne.
James Wood	Anamosa	Jones.

CORRESPONDENTS.

The number of correspondents of the Service is very great. We receive information from many quarters, and are often asked for information not only concerning our immediate work, but about many other things. The great extent of this correspondence is very burdensome, and much has been left unanswered simply because it was impossible to do otherwise.

However, letters descriptive of meterological occurrences, if brief and to the point, and plainly written, will always be welcome, and their receipt will be promptly acknowledged by card. To more completely gather this class of information, it is proposed to organize a body of regular correspondents for this purpose, mainly on the basis of the above list of crop reporters, whose work was discontinued early this summer.

STUDENTS IN METEOROLOGY.

The efficiency of the Service implies that volunteers and volunteer observers are, to a considerable extent, studying practical meteorology. In this sense our Service is, no doubt, a great school, the influence of which will be felt in due time.

In addition, we have at the State University a small class in meteorology during each spring term. This class is fully instructed in the observation of phenomena, in the ordinary instrumental observations, and in many of the processes of reduction and discussion that may be classed as office-work in meteorology.

The following is a list of these classes:

Frank Bond, Fred. Bond, Frank Buerckle, A. Dean Robinson, and G. S. Trowbridge, in 1879.

Geo. K. Reeder, of Cedar Rapids, and August L. Schricker, of Davenport; in 1880.

Miss Grace Hebard, of Johnson, and Messrs. Will E. Crane, of Cerro Gordo, Alberto A. Ladd, of Clayton, Geo. L. Leslie, of Muscatine, and Fred O. Newcomb, of Butler county, during the spring of 1881.

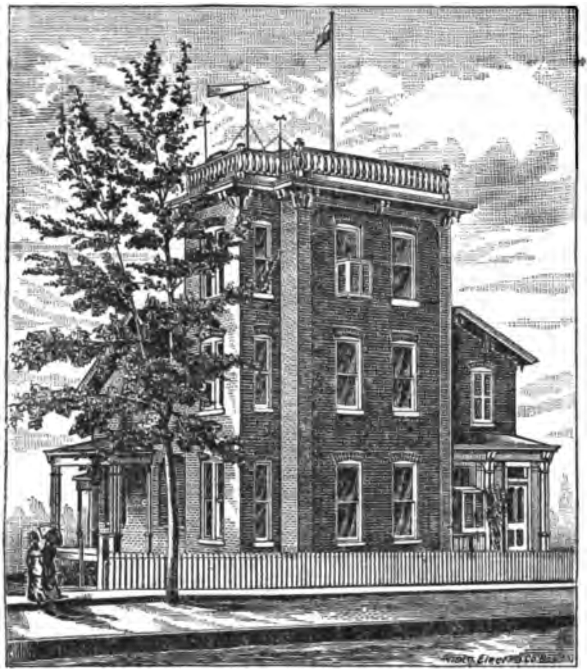
The work of permanent value done by the class of 1880 was the reduction of the mean daily temperature at Iowa City from the observations of Prof. T. S. Parvin during the ten years, 1861–1870; the values being taken from his original record.

The class of 1881 has in a like manner reduced the two o'clock observations of Prof. Parvin, made during the same period of years.

Opportunities for practical instruction in this work are exceedingly rare in this country.

CENTRAL STATION.

The act of the Seventeenth General Assembly of Iowa, establishing the Central Station and appointing the Director of the Iowa Weather Service, did not appropriate means for the erection of such an institution, nor give any compensation to the Director, whose very extensive duties were defined by the same act. But the chief institution of the meteorological system of a great State cannot be crowded into a spare-room. The problem of providing the necessary room was very pressing even during the first year of the Service as a State institution. During the summer months of the year 1879 the Director, therefore, had erected a three-story structure in the entering angle of his residence; the two upper stories and the flat roof or terrace of this structure were set apart for the use of the Service, and have been so occupied since September, 1879. But the growth of the Service has required two additional rooms to be devoted to this purpose, as well as a small hall, making, in all, four rooms, a fine terrace and a hall so used; that is, one room more than the entire addition erected in 1879, and represented as seen from the northeast in the cut here inserted. It may



not be improper to state that in furnishing this Central Station to the State Service the Director has, by his labor in other fields, to earn annually at least $150 to meet the expenses which this institution necessitates.* Is not this burden too much for a citizen without fortune, and will it not be growing heavier as he increases in age?

On the roof or *terrace* of this building are the instruments which require full exposure, such as wind-vanes, wind force plate, Robinson's anemometer, insolation thermometer, radiation thermometer, rain-gauge, evaporimeter, and the like; also, a flag-staff for the display of flag and lantern signals. Besides, this terrace is the place for observation of sun-spots, and of all general meteorological phenomena, as it furnishes a fine view of the entire landscape and a free view of the sky, the building standing near the edge of the bluff east of the Iowa River.

The room immediately below this terrace is the meteorological *observatory* proper. The windows furnish a fine view of the sky in all directions, and an arrow on the ceiling marks the direction of the wind. Standard mercurial barometers and aneroids give the pressure of the air, while temperature and humidity are observed on a full set of standard thermometers, a psychrometer and an improved hair-hygrometer in the case attached to the east window of the north wall. Here are also many additional instruments, and meteorological collections have been begun, such as wind-worn and polished rocks, specimens of wood showing the effects of tornadoes and of lightning and especially a fine collection of meteorites from all parts of the globe. It is hoped that the State in a near future will provide the necessary means for self-registering instruments, for which an excellent installation can be obtained in this observatory.

The terrace and the observatory just described complete the CENTRAL STATION, as this term is generally used; but in the act referred to this term is made to include also what technically is known as the CENTRAL OFFICE; namely, "the chief office intrusted by the government with the management, collection, and publication of the meteorological observations of the country," here the State of Iowa.† Our Central OFFICE proper occupies the room immediately below the Observatory; south of it, in the old part of our dwellling, is a hall with a small meterological REFERENCE LIBRARY and filing cases containing parts of reports, ready or nearly ready for the State Printer. East of this hall is a room containing the great file of all STATION REPORTS in filing cases, the stock of blanks of all kinds, and the stock of instruments for stations; also, electrotypes and photo-electrotypes of maps, and files of meteorological publications from all parts of the world. A room to the west of this hall contains the stock of publications of the Service not yet distributed, and serves as MAILING ROOM and as office for the clerk. All of these rooms are very crowded.

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*The amount of interest actually paid is $120; increased taxes and heating are certainly over $30. No reference is had to the furniture or to the large number of instruments and appliances used exclusively for this State work.

†Report of the Permanent Committee of the First International Meteorological Congress at Vienna, for the year 1874.—London, 1875, page 67.

The most valuable property in these rooms is the great file of OBSERVATORY STATION REPORTS. The original reports of each month are in a single filing case, in which the individual reports are arranged in the same order in which the stations are numbered in the "Summary of all Stations" of pages 6 and 7 of each monthly report published. These cases are arranged in the order of time, so that the original report of any station for any given month can be instantly produced for reference or study. This file contains now nearly six thousand full monthly reports, representing about one hundred and eighty thousand days of observation. The pentade reports and descriptive note are filed in the same manner in other filing cases, largely increasing the number of meteorological documents above the figure of reports just given.

Another interesting feature is the stock of BLANKS for observers, Central Station and Central Office; the number of forms in actual use is very considerable, and represents in the course of a year a large outlay from the small appropriation at disposal. Would it not be well to furnish the Weather Service with blanks and all other stationery direct by the proper State authority, without drawing for this purpose upon the special appropriation?

The work done in the mailing room is very considerable, averaging over one thousand separate parcels a month, or a quarter-hundred thousand during the biennial period. All parcels are very carefully wrapped and plainly addressed.

OFFICE PRINTING, by means of the electric pen and duplicating press, has been much reduced; also, hektograph process is but little used now.

The TESTING OF INSTRUMENTS, especially thermometers, represents a considerable amount of work. As the means at disposal do not allow the purchase of high-priced instruments, suitable instruments are by test selected from cheaper sources. However, the instruments actually sent out to observers compare, on account of this selection, favorably in their working with instruments used elsewhere.

The subject of CORRESPONDENCE has been referred to above. It is simply impossible to attend to all that is wanted in this line without seriously neglecting work which is essential to the very continuance of the Service. It should never be forgotten that in this work there is no cessation; every day brings its load of facts and data which have to be properly classified, recorded and disposed of.

In order to make the kind and magnitude of the common work required to be done at the Central Office more generally understood, it may be best to indicate what is necessary to prepare manuscript of one number of the Monthly Bulletin of the Service.

On the first of each month, the very full record kept at the observatory of the Central Station is transcribed upon special blanks, four sheets quarto; then all columns are summed up and checked. This prepares the manuscript of four pages of each monthly report, precisely as printed on the pages 2, 3, 4 and 5 of each monthly number. The careful copying, and the summing up of two hundred columns of figures, ten in height each, constitute quite a job. In addition, maxima and minima have to be sought, wind directions have to be separated and summed, and number of days have to be counted, before the summary of the observation of the Central Station is complete. Thereafter the decade means, and the monthly means obtained therefrom, are recorded in full, first in the order in which they occur, that is forming great tables of the year. The pages printed on pages 210–216 in the Report for 1878 may serve as an example; in each fourth quarterly number of the Report these seven tables will be found. Thereafter all these values are entered in another record, which gives the values for each period in the consecutive years, so as to enable a comparison to be made for each single decade and for the entire month as to the different years. A very brief extract of the monthly tables of this kind is printed on the second page of each monthly bulletin, and also on the eighth page of each monthly Report for 1881. By comparing these values with the *means* for many years of previous observation, it will be seen whether the given period is warm or cold, wet or dry, and to what extent any element or the weather was above or below the normal value. All this work was necessary to obtain the few introductory lines of the Press-Bulletin of the month, expressive of the general character of the month.

While this work has been going on at the Central Office, the *station* *reports* of the volunteer observers have been coming in with every mail. From each envelope the contents are carefully removed, first examined as to proper naming of station and month on each paper contained in the same, and thereafter the several papers are assorted; namely, monthly reports, forms A and B; additional instrumental report, forms C and D; note-slips on phenomena; note-slips on official correspondence. The first are generally dated by the official stamp, to show date of receipt; the last are put aside for action and reply after the Bulletin shall have been completed; the third—namely, note-slips on phenomena—are re-examined and assorted according to kind of phenomena and dates; the second, additional and instrumental reports, are laid over for special study and reduction.

The first, namely the principal Monthly Reports of stations (forms A and B, see electrotype printed pages 9, 15), are now taken up, and their contents carefully examined, and a summary made upon the office blank CO, 1, printed here. The summary is taken directly from the individual entries of the observer, not by copying the observer's own summary.

Month—————— *Station*—————— *No.*——————

IOWA WEATHER SERVICE.

Monthly Summary made at the Central Office, from the original entries of the Observer's Report.

CO, 1.

Rain-fall.

Decade I.....		
Decade II ...		
Decade III ..		
Month		

Greatest Am't: *Date:*

Number of Days.

● *▲	*	▲	K

Mean Temperature at Noon: ——

PHENOMENA:
DATE AND TIME.

∞ ——	≡ ——
⌴ ——	●² ——
PB ——	/ ——
⌒ ——	▲ ——
ω ——	TB ——
○ ——	K² ——
♞ ——	♛ ——

Observer—————— *Report*——————

When these summaries are compiled, the results entered upon these cards are transcribed to a tabular form, which is found printed on pages 6 and 7 of each monthly report under the heading "Summary of all Stations." After having served this purpose, the same cards are again used for the entry of the decade rain-fall upon a special large manuscript table, enabling the Director to judge of the distribution of rain-fall in the State by decades or ten-day periods. Finally these cards are distributed by *stations* for the current year, while the original reports received from the observers are filed by months, as has been explained before.

The tables of summaries having been completed, the values herein collected are again read off and entered upon blank maps of Iowa. For this purpose the large map (scale thirty miles to the inch) sent with the first number of the report for 1878, is used. In this manner we obtain for each month the following series of maps: 1, total rain-fall; 2, greatest amount of rain-fall on one day; 3, date of this day; 4, number of days with snow; 5, number of days with hail; 6, number of days with thunder and lightning; and 8, mean temperature at noon. This series of maps is invariably constructed and compiled by the drawing of lines for equal value and proper shading of the field thus determined.

But quite generally additional maps have to be constructed, to represent noted phenomena, such as the observation of meteors, auroræ, and the distribution of first or last frosts, of early snow-fall, of heavy rain-storms, marked hail-streaks, etc., etc. Finally, on township blank maps, details in regard to wind and other storms are entered for any single date.

In addition to all this, the pentade reports from twelve stations have been received throughout the month, and have been copied in full by dates on blanks at the time. Thus eight pages folio of manuscript tables have been constructed for the month, exactly as printed on the last eight pages of each monthly report (pages 9 to 16 inclusive). Wenever called for, the condition at noon for any one date, together with the phenomena preceding and following this instant are entered upon blank maps of half scale (sixty miles to the inch). Months with noted atmospheric disturbances call for many such additional maps.

With all these data sifted, tabulated and mapped before him, the Director again examines the note-slips on phenomena; and clippings from newspapers on especially noted phenomena are now added, since our papers generally give quite elaborate accounts of local damage by flood and storm, and also generally notice remarkable meteorological displays.

When all this matter has been carefully studied, the balance of the Press Bulletin is written, and the greatest possible effort made to present the most marked features of this mass of facts in the clearest manner and the smallest number of words. Very few people have an idea of the pains that are taken in this matter, and the extent of fact that is crowded into the few lines of such a Bulletin.

The Press Bulletin now goes to the local printer, who furnishes immediately a sufficient number of ADVANCE PROOFS FOR PUBLICATION, which are mailed to all dailies of Iowa, and a number of weeklies which have promised to regularly insert these bulletins in full or nearly so. Upon the same terms, these advance proofs will be sent to any other Iowa paper not now on the mailing list of the Service. By this means the general condition of the weather that has prevailed, as compared to preceding years, becomes known to a very large circle of readers in Iowa.

The service is under great obligation to the publishers of the following weekly papers for the receipt of the same:

State Register, Des Moines; *Gazette*, Davenport; *Courier*, and *Democrat*, Ottumwa; *Republican*, Cedar Rapids; *Der National Demokrat*, Dubuque; *Journal*, Sioux City; *Times-Republican*, Marshalltown; *Homestead*, Des Moines; *Republican* and *State-Press*, Iowa City.

At times the value of this information is belittled, and predictions are demanded. But so long as newspapers are read through they give only information of what has occurred, and so long as actual election returns are prepared to ante-election guesses, and above all, so long as any civilized commonwealth gathers statistics to outline its own history, so long will the work of observation and recording of the actual condition of the weather, and the proper publication of the results thereof, remain the first and most important duty of any weather service.

While the advance-proof of the Press Bulletin is being printed and mailed, the preparation of the manuscript for the balance of the weather bulletin continues. This work is hurried as much as possible, and generally the entire Bulletin is mailed by the tenth of the month. The edition printed is one thousand, now generally four pages octavo, but the number for June, 1881, was 12 pages. The mailing of the Bulletin, in 800 separately addressed and stamped parcels, closes this work for the month.

If all observers mailed their reports on the first, or latest on the second, all reports would be received on the fourth, or latest the fifth, except in extraordinary cases. It would then be possible to finish all the tables, maps, and cards at one time, and a larger number of stations could be managed. But, unfortunately, quite a number of observers are habitually tardy, and the disposal of these TARDY REPORTS entails a great deal of extra labor and worry. Several plans have been tried to remedy this evil, but thus far with indifferent success.

Having thus briefly indicated the work which is done during the first decade of each month at the Central Station in the preparation of the BULLETIN, the work remaining to be done for the REPORT should be pointed out. Tables and maps are completed as far as possible with the returns from tardy stations, and additional notes are prepared that could not find room in the Bulletin. More comple history of noted storms and phenomena have to be drawn up, for which tables, maps, plans, etc., must be prepared. Also the larger manuscript maps have to be reduced to a smaller scale and carefully drawn with photo-engraving ink in order that photo-electrotypes may be obtained from the same. The amount of very tedious and difficult drawing that has been done in this manner at the Central Office is very considerable; but, since the means of the Service allow no other way to map illustration, this work, however onerous, must continue to be done.

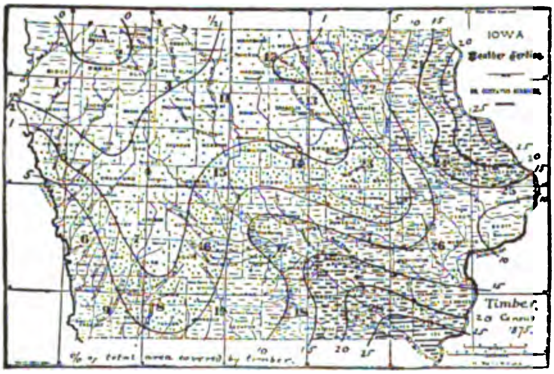
In addition to all this, the results of like period for different years have to be reduced, for each station separately, in order to arrive at general results and normals. The 26,082 rain-fall observations made by this Service in Iowa during the lustrum from January 1, 1876 to December 31, 1880, and received at this office on nearly five thousand individual monthly reports, have thus been fully reduced, from the separate rain-fall measurements up to the normal monthly mean for each station.

On pages 3–11 of the Report for 1881, the general monthly results are given in tabular form, and yearly the rain-maps are printed from photo-electrotypes obtained from my pen-drawings. While referring to these data and to a more complete exposition of the results now being prepared for a future number of the Report, it is deemed advisable to give here the monthly maps showing the distribution of the rain-fall in Iowa during this period of five years. See map facing the title page.

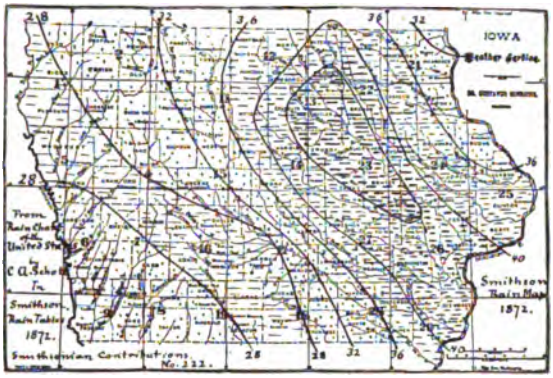
These maps, giving a graphical representation of all the rain measures taken in Iowa by this service for the lustrum 1876–80, show: that the summer rains greatly predominate; during the winter months the rain-fall is greatest in the eastern parts of the State; that from March the rains spread farther west, till in May the greatest rain-fall occurs in the southwestern parts of the State; that the rain-fall in June is most marked both in the southwest and northwest, but less so in central Iowa; that these features become more pronounced in July, when a broad belt from southeast to northwest receives the least rain; that in August the rain-fall is most abundant in the middle and eastern tiers of the State, comprising our great corn belt; that in September the belt of greatest rain-fall exhibits again a southwest-northeasterly outline, from which, by the diminution of rain-fall at the approach of the cold season, the winter distribution results.

The mean yearly rain-fall for the entire State is represented by the middle map for the same period. It will be noticed how remarkably diversified the State is in regard to the rain-fall; while generally increasing in a southeasterly direction, it is apparent that powerfully modifying causes are in operation.

A comparison of this map, representing the distribution of the yearly rain-fall in Iowa, with the following little map, exhibiting the distribution of timber in Iowa, according to the State census of 1875, will reveal so close a similarity in the specific form of the curves, that we cannot help but conclude, that the amount of timber and the yearly rain-fall are closely related, a circumstance to which the Director has already repeatedly referred to in former publications.



These rain maps are not only the first maps of the kind ever published for our own State, but they are the only monthly rain maps, based upon uniform, reliable, and extended observations for an equally large area of the United States. This remark applies with equal force to the map representing the yearly rain-fall; it will readily be seen that the rain-fall map published by the Smithsonian Institution in 1872, has only a few points of resemblance. It was not to be expected that the few irregular observations upon which the same is based could lead to a reliable result in so intricate a subject.


IOWA
Weather Service
From Rain Chart of the United States by C. A. Schott Jr.
Smithsonian Rain Tables 1872.
Smithsonian Contributions No. 222.
Smithsonian Rain Map 1872.
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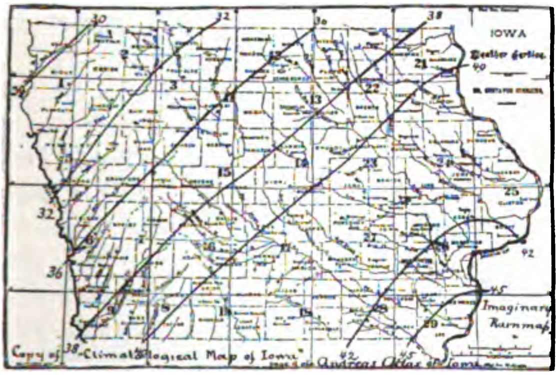
But the most remarkable rain map of Iowa ever published is found in thousands of Iowa homes; namely, a half-page map in Andreas' Atlas of Iowa, page 9. I here give an accurate, though greatly reduced, copy of this remarkable work of imagination, in order that it may be contrasted with the graphical representation of facts given in the central map of the group considered above. In nature, fact is always more strange than fiction.


IOWA
Weather Service
Imaginary Rain map
Copy of "Climatological Map of Iowa" page 9 of Andreas' Atlas of Iowa
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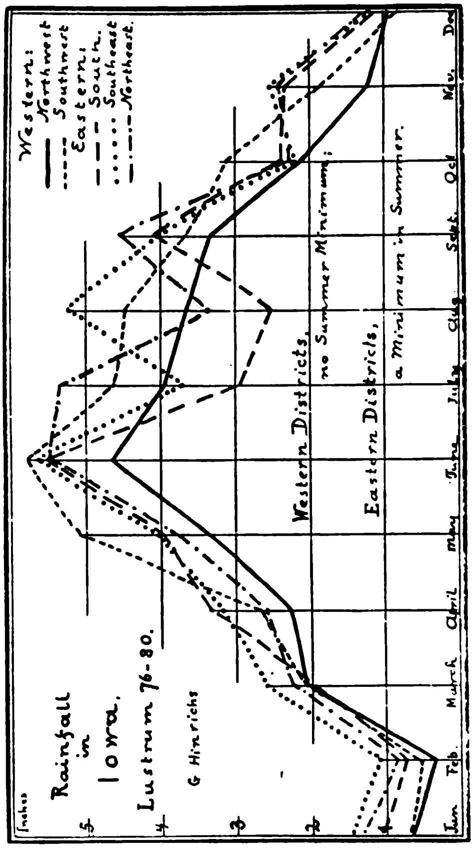
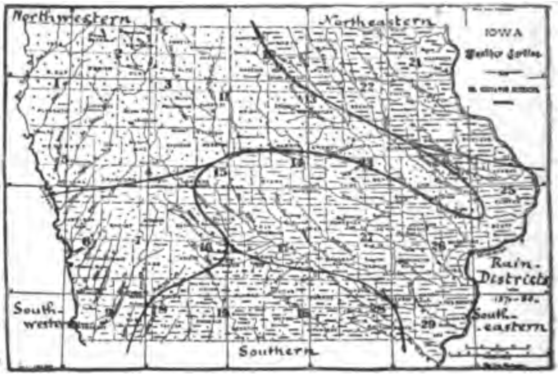
So far as the monthly distribution of rain-fall is concerned, the result of the observations of the Service show that in western Iowa no marked minimum of rain-fall occurs in summer, but that the rain-fall in April is but little greater than in March, while in eastern Iowa we find such a minimum in summer, but have higher rain-fall in April than in March. The tendency to a spring drouth thus is greater in the west, but summer drouths are more likely to occur in the east of Iowa. It will also be noticed by a closer inspection of the diagram given (which graphically represents the figures printed at the close of the table on page 5, of Report for 1881) that the rain-fall in the southwest is in all months greater than that of the northwest. Finally, the diagram exhibits the fact, that the summer minimum occurs in July in the southeast, in August in the northeast, and is most lasting in the south, where it extends over both July and August.



It thus appears that we may distinguish five well marked rain districts in Iowa. The boundaries of these districts, for the lustrum 1876-80, are drawn upon the map and inserted. As the seasons from year to year differ somewhat

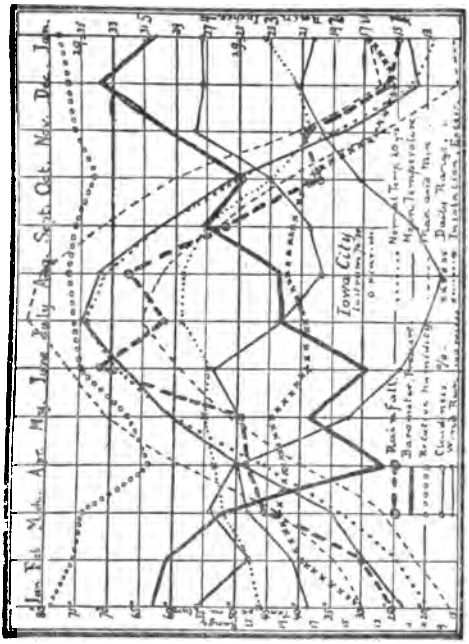


in their character, these boundaries will fluctuate correspondingly, in harmony with the character of the prevailing wind.

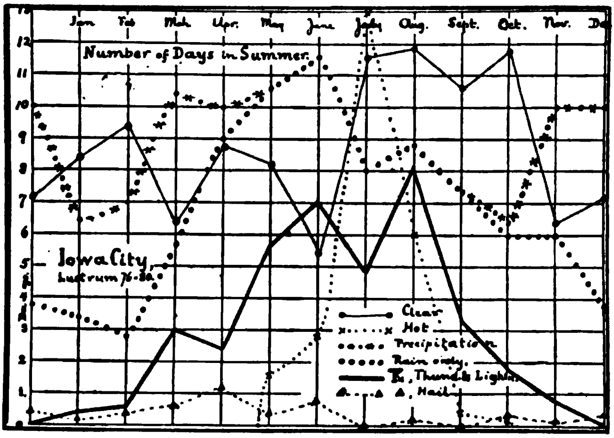
In addition to the reduction of the rain-fall observations made in Iowa, the earlier observation at Iowa City have also been reduced at the Central Office. The general results, so far as temperature and rain-fall are concerned, have been published in the report for 1881, on page 13, in tabular form. These values will constitute the TWENTY YEARS' NORMALS FOR IOWA CITY, wherewith all other observations are compared. This is the longest series of observations completely reduced for any point in Iowa.

The observations made at the Central Station, during the lustrum 1876–80, have also separately been quite fully reduced. The results of this work are given in tabular form on pages 14, 15 and 16 of the Report for 1881, and graphically in the three pen-drawings here inserted.

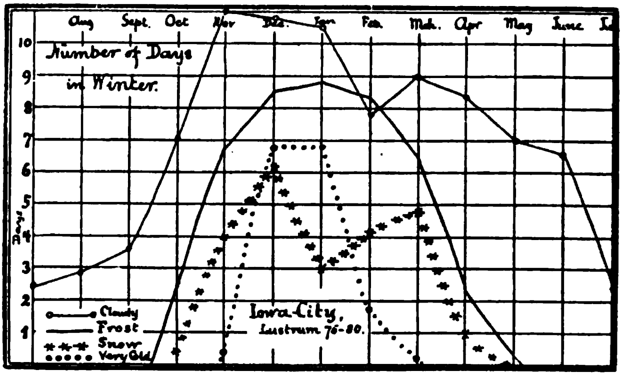
The first of these diagrams shows that the pressure of the air is lowest during the spring month April, and in June, months not unfrequently marked by destructive tornadoes. The barometer gradually rises during the summer and fall months, with a small reversion in October; it reaches its highest position in December. The annual variation of the other elements is equally well represented in this diagram; namely, the rain-fall, relative humidity, cloudiness, total run of the wind; also, the twenty years' normal and mean temperatures for the lustrum, the mean maximum and minimum temperatures, the mean daily range, and noon excess of insolation. It will readily be noted that the air is driest in spring, and the sky is clearest in late summer, when also the wind is lowest.



The second of these diagrams represents the general character of our *summers* by giving the mean monthly number of days for each of the principal elements, as observed during the five years of the lustrum 1876–80. Thus it will be seen that the hot days begin with May, and are most numerous in July. The number of clear days is remarkably great from July to October; a feature very characteristic of our climate. The curve representing the number of days with thunder and lightning is also very interesting and characteristic; for not only is this number quite high throughout the summer, but it shows a marked minimum in August.



The third of these diagrams represents in the same manner the most characteristic features of our *winter* to the eye. The number of very cold days is high in December and January; the number of days with frost very gradually increases till January, and thereafter diminishes with equal regularity. The curve representing the number of cloudy days shows that on the whole our winter is the cloudy season.



Many other examples of the work done at the Central Station might be mentioned, but this already bulky report would become too much so,

The work which has to be done at this office is very great and growing. In former years, some leisure was left me, even after doing much remunerative work in chemical analysis, as all able chemists do who receive but a moderate salary as professors. Now, this additional remunerative work has been given up in favor of unpaid work done for this Service. May not a great State make the burden less oppressive by giving a reasonable compensation? Would such a policy not be good economy?

In conclusion it is necessary to refer to the regular PUBLICATIONS of the Service; namely, the BULLETIN and the quarterly REPORT.

The MONTHLY BULLETIN of the Iowa Weather Service is solely intended to furnish, at the earliest date possible, a reliable exposition in brief of the actual condition of the weather in this State for the month concerned. Each BULLETIN is based upon fully a quarter thousand individual reports and special notes received from all parts of the State.

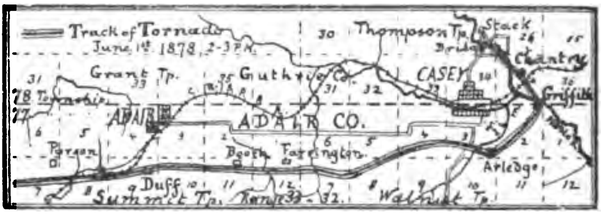
The BULLETIN is now, since January, 1881, a four-page octavo, which, in case the weather was unusually varied, is increased to eight, ten, or even twelve pages. It is mailed to all State officers and State institutions, members of the General Assembly, observers and correspondents, and to meteorological institutions and meteorologists at home and abroad. It is highly estimated, and exerts a great influence for good in the work of the observers of the Service. The current volume, inclusive of the September BULLETIN, now embraces fifty pages and a cover giving a view of the Central Station and a model monthly report for the instruction of the observers. It is very desirable that the cost of this publication should not be met from the general appropriation of the Service. The cost of postage for mailing is too high, but the postal authorities at Washington have, thus far, refused to class this BULLETIN as second-class matter, although the mails do carry the *Monthly Weather Review*, issued by the Military Weather Service (a branch of the Signal Service of the Army), as second-class matter at pound rates. It is an incontrovertible fact that both publications are of the same nature, issued in the same manner, and distributed in the same manner; but our State Volunteer Service is compelled to pay circular rate of postage, while the military service is allowed to send its monthly publication at pound rates.

The quarterly WEATHER REPORT is necessarily later in its appearance, and during the first years of the service the work of organization and development imperatively took precedence. However, our Service is more nearly abreast with the current phenomena in its REPORT than many others, and during the summer vacation the Director has devoted his entire time to the progress of this work of publication.

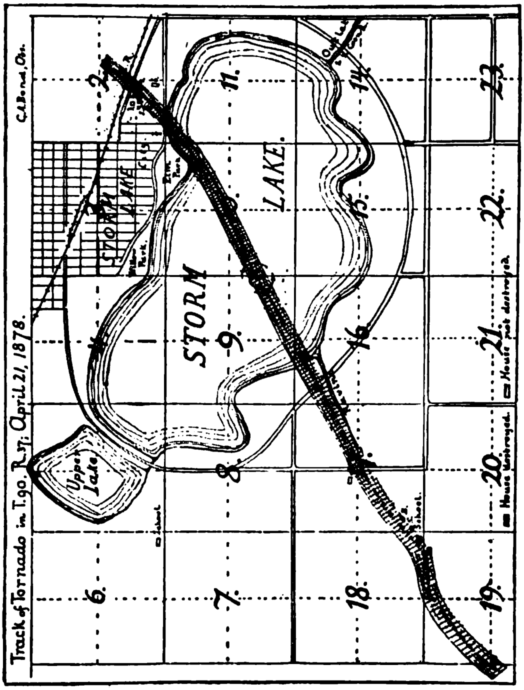
The following numbers of the **Report** have, thus far, been published:

Report for 1878.—No. 1, January, February, March, April; No. 2, May, June, July, August; No. 3, September, October, November, December.

Of the concluding No. 4, the summaries and most of the description of the great Easter storm, with maps, are printed. Additional maps have been drawn and photo-electrotyped this summer, so that the work of printing may now be resumed and readily completed. As examples I insert here the map repesenting the track of the tornado which, on June 1, 1878, traveled the northern part of Adair county and curiously moved *around* the town of Casey. This saving of Casey may have been due to the peculiar direction of the water-courses shown on the map.



In the great Easter storm the town of Storm Lake was directly in line of the tornado's track; but probably the influence of the lake drew the track slightly southward, so as to save the town. The photo-electrotype of my pen-drawing, based upon Observer **Bond**'s sketch, is here inserted as an additional example of this part of the **Report**, which now will be entirely finished shortly. **The Report for** 1879 is also completed so far as the three numbers are concerned, giving the full report for the twelve months of the



year; but No. 4 is not yet finished, though the manuscript tables are all ready. The special account of the meteor of May 10th will be the principal subject of general interest in this number.

THE REPORT FOR 1880 is in an advanced state of preparation at this office, but it was deemed best to first finish the preceding reports and to bring the REPORT FOR 1881 as nearly up to date as possible. Accordingly, No. 1 and 2 of this report are published, embracing all data of the monthly reports for the first eight months of this year; namely, from January to August, inclusive. The first sixteen pages of this report give the results for the past lustrum above illustrated by maps and diagrams.

It is reasonably to be expected that under the more nearly perfected system now in operation, all numbers now behind; namely, No. 4 for 1878, No. 4 for 1879, and Nos. 1-4 for 1880, will be issued before August, 1882.

It may be proper to add a word in regard to the maps and other illustrations in the reports. It was found that no provision had been made for illustrations, so that the cost of all so furnished had to be drawn from the appropriation. After much work the photo-electrotypes made from my pen-drawings have been found to be the most available—cheap enough in point of cost, and, if examined through an ordinary reading glass, plain enough for study. The original working maps drawn by me are to the scale of thirty miles to the inch. These maps are reduced to half, or sixty miles to the inch, in my final and very careful pen-drawings. These are, by the Photo-electrotype Company of Boston, again reduced to half size; *i. e.*, to a scale of 120 miles to the inch, many of which maps are inserted in the body of this report. As the preparation of the final drawing for the photo-electrotyper is additional work for me—work which would rate at fully twice the cost of the electrotypes obtained—I would greatly prefer some other method, such as lithographing, which could be done from my working drawing. But it is impossible to find the means for this work.

Finally, it must be said, that, in order to place the work of the Service upon a proper basis of merit, everything of a general nature has been carefully excluded from the body of the reports so far published. If, however, when the reports shall have been brought completely up to date, extra time shall be found, it will be used to furnish, for the fourth annual number of each yearly volume, such more general information and theory as will reflect the present and foreshadow the probable coming condition of the science of meteorology. But however tempting it may be to turn aside from the drudgery of the summing of facts and observations to the more entertaining exposition of principle and theory, I trust that I shall always feel it my duty first to attend to the necessary work of making the report a faithful exposition of the actual condition of the weather in our State of Iowa, so that our Weather Reports will continue to be of value long after views and theories shall have passed away.

APPROPRIATION.

The appropriation made in section four of the act establishing the Iowa Weather Service has been drawn and expended as shown by the classified synopsis of expenditures, the complete list of individual vouchers sent to the Auditor of State, and the list of warrants received from the same.

I. SYNOPSIS OF EXPENDITURES.

POSTAGE:	4,500 postal cards	$ 45.00	
	5,000 wrappers	56.00	
	18,300 stamps	281.50	
			$ 382.50
PUBLICATION AND BLANKS:	Stationery	$185.05	
	Printing	399.60	
	Engraving, cuts	151.82	
			736.47
CLERK HIRE			520.00
INSTRUMENTS			188.90
INSPECTION OF STATIONS			21.60
ALL OTHER EXPENDITURES			124.75
Total			$1,974.22

II. LIST OF VOUCHERS.

No.	PERSON.	OBJECT.	Amount.
119	B. Owen, P. M	500 stamps	$ 5.00
120	B. Owen, P. M	300 stamps	5.00
121	J. P. Irish	Printing	30.25
122	Expressage	On instrument	3.00
123	B. Owen, P. M	800 stamps	10.00
124	United States Express Company	From State Binder	1.00
125	Matt. Parrott, State Binder	Extra copies	1.50
126	B. Owen, P. M.	1,400 stamps	30.00
127	G. Hinrichs, Jr.	Clerk, Sept., Oct., Nov	60.00
128	Republican Pub. Co., Iowa City	Printing blanks	18.00
129	J. P. Irish	Printing	25.00
130	George H. Bliss, Chicago	Electric pen, supplies	2.50
131	J. Bowles	Mimograph	3.50
132	B. Owen, P. M	200 stamps	2.00
133	Pryce and Schell	Howe package scale	6.50
134	United States Express Company	Instruments to observers	1.20
135	B. Owen, P. M	400 stamps	10.00
136	James Lee	Paper and binding	21.60
137	Mrs. J. G. Fink	Stationery	23.69
138	Republican Publishing Company	Printing	3.00
139	G. Hinrichs, Director	Petty expenses	3.30
140	B. Owen, P. M	400 stamps	5.00
141	B. Owen, P. M	500 stamps	5.00
142	Mills & Company, Des Moines	Engraving and printing	57.40
143	B. Owen, P. M	500 stamps	5.00
144	B. Owen, P. M.	1,000 postal cards	10 00
145	J. G. Fink	Stationery	10.15
146	James Lee	Binding	38.70
147	James Lee	Paper, blank books	24.00
148	J. P. Irish	Printing	11.50
149	B. Owen, P. M.	800 stamps	10.00
150	Culver, Page, Hoyne & Co., Chicago	Filing cases	13.50
151	Theo. Goldschmid, Philadelphia	Hair hygrometer	12.00
152	B. Owen, P. M	800 stamps	10.00
153	B. Owen, P. M	500 postal cards	5.00
154	B. Owen, P. M	500 postal cards	5.00
155	G. Hinrichs, Director	Traveling expenses	12.00
156	G. Hinrichs, Director	Expressage, petty expenses	4 25
157	G. Hinrichs, Jr	Clerk, December, 1879	20.00
158	Iowa City Republican Publishing Co.	Printing	10.25
159	J. G. Fink	Thermometers	31.55
160	Marsh & Holubar	Rain-collectors, evaporimeters	15.75
161	J. P. Irish	Printing	13.00
162	G. Hinrichs, Jr	Clerk, January, February	50 00
163	B. Owen, P. M	500 stamps	5.00
164	B. Owen, P. M	500 cards, 500 stamps	10.00
165	Rand, McNally & Co., Chicago	Maps	8.80
166	B. Owen, P. M.	Money-order (fees)	1.20
167	American Express Company	Instruments to stations	4.45
168	United States Express Company	Instruments to stations	5.05
169	B. Owen, P. M	500 stamps	5.00

LIST OF VOUCHERS.—Continued.

No.	PERSON.	OBJECT.	Amount.
170	B. Owen, P. M	500 stamps	$ 5.00
171	J. P. Irish	Printing	17.00
172	Republican Publishing Co	Printing	8.25
173	J. A. Pickering	Signal lanterns	19.93
174	Rand, McNally & Co., Chicago	Map U. S	4.00
175	G. Hinrichs, Jr	Clerk, March, April	50.00
176	B. Owen, P. M	400 stamps	10.00
177	G. Hinrichs, Director	Petty expenses	2.05
178	Maresh & Holubar	Thermometer shades	23.88
179	J. Ricord, P. M	400 stamps	10.00
180	J. Ricord, P. M	500 stamps	5.00
181	T. J. Rigg	Signal-oil	2.00
182	S. L. Sounders	Oil-can	.65
183	O. Startsman	Repairing	1.00
184	Anna Hinrichs, Jr	Clerk, May, June	40.00
185	J. P. Irish	Printing	13.00
186	J. Ricord, P. M	250 stamps	5.00
187	J. Ricord, P. M	150 stamps	4.50
188	H. W. Boerner & Son	Mimograph	4.55
189	J. Ricord, P. M	500 stamps	5.00
190	Barnhart Bros. & Spindler, Chicago	Weather symbols, type	9.90
191	J. Ricord, P. M	500 stamps	5.00
192	J. Ricord, P. M	500 stamps	5.00
193	J. P. Irish	Printing	13.00
194	Republican Co	Printing	21.00
195	Anna Hinrichs, Jr	Clerk, July, August	40.00
196	J. G. Fink	Stationery	15.28
197	J. G. Fink	Thermometers	17.85
198	Express Co	Expressage	1.85
199	G. Hinrichs, Director	Petty expenses	1.80
200	Iowa City post-office	500 stamps	5.00
201	Iowa City post-office	600 stamps	10.00
202	Iowa City post-office	400 stamps	10.00
203	J. Ricord, P. M	800 stamps	20.00
204	J. P. Irish	Printing	13.00
205	Iowa City post-office	1,000 cards	10.00
206	Iowa City post-office	500 stamps	15.00
207	Will Hohenschuh	Three boxes	1.50
208	Republican Publishing Co	Printing	45.25
209	Anna Hinrichs, Jr	Clerk, Sept., Oct., Nov., 1880	60.00
210	Theo. J. Goldschmid, Philadelphia	Barometer	10.25
211	John Kendall & Co	Barometer, thermometers	29.62
212	James Lee	Stationery	14.12
213	J. Ricord, P. M	500 stamps	5.00
214	Smith & Mullen	Stationery	4.55
215	J. Ricord, P. M	500 stamps	5.00
216	G. Hinrichs, Director	Petty expenses	.85
217	G. Hinrichs, Director	Traveling expenses	9.60
218	Iowa City post-office	1,000 stamps	10.00
219	J. P. Irish	Printing	20.50
220	J. Ricord, P. M	1,000 wrappers	11.20
221	Anna Hinrichs, Jr	Clerk, Dec., '80, Jan. '81	50.00
222	Iowa City post-office	500 wrappers	5.60
223	J. P. Irish	Printing	15.50
224	Iowa City post-office	500 wrappers	5.60
225	Anna Hinrichs, Jr	Clerk, Feb., March, 1881	50.00
226	Republican Publishing Co	Printing	6.35
227	F. Seeman	Binding	8.50

LIST OF VOUCHERS—CONTINUED.

No.	PERSON.	OBJECT.	Amount.
228	Mrs. J. G. Fink	Stationery	$ 20.46
229	Iowa City post-office	300 stamps	5.00
230	John P. Irish	Printing	14.00
231	Iowa City post-office	500 wrappers	5.60
232	J. Ricord, P. M	500 wrappers	5.60
233	Anna Hinrichs, Jr	Clerk, April, May	50.00
234	James Lee	Stationery	4.00
235	Iowa City post-office	500 stamps, 500 wrappers	20 60
236	J. Ricord, P. M	1,000 postal cards	10.00
237	Republican Publishing Company	Printing	15.60
238	J. Ricord, P. M	600 stamps	10.00
239	Director	Petty expenses	3.95
240	United States Express Company	Expressage	.80
241	American Express Company	Expressage	1.75
242	Iowa City post-office	1,000 wrappers	11.20
243	Keuffel & Esser, New York	Instruments	48.00
244	W. C. Chalfant	Document and card cases	14.00
245	Barnhart Bros. & Spindler, Chicago	Weather symbols, type	14.62
246	Photo-electrotype Company, Boston	Photo-electrotypes and express	43.10
247	J. P Irish	Printing	31.40
248	Iowa City post-office	500 wrappers	5.60
249	Iowa City post-office	300 stamps	5.00
250	Republican Publishing Company	Printing	23.75
251	Photo-electrotype Company, Boston	Photo-electrotypes and express	26.30
252	Anna Hinrichs, Jr	Clerk, June, July	50.00
253	Republican Publishing Company	Printing	31.00
254	Express Company	Expressage	4.30
			$1,974.22

III—VOUCHERS SENT TO AUDITOR OF STATE.

1880.	Jan. 1.	Vouchers Nos. 119–139	$ 266.04	
	April 26.	Vouchers Nos. 140–159	268.75	
	July 24.	Vouchers Nos. 159–177	266.05	
	Oct. 30.	Vouchers Nos. 178–199	245.26	
1881.	Jan. 12.	Vouchers Nos. 200–216	259.14	
	July 27.	Vouchers Nos. 217–239	357.66	
	Sept. 29.	Vouchers Nos. 240–254	311.32	
				$1,974.22

IV—STATE WARRANTS RECEIVED FROM ADUITOR OF STATE.

1880.	Jan. 6.	Warrant 31429	$ 248 60	
	April 29.	Warrant 33127	286.19	
	July 26.	Warrant 33910	266.05	
	Nov. —	Warrant ——	245.26	
1881.	Jan. 15.	Warrant 35591	259.14	
	July 30.	Warrant 37081	357.66	
	Sept. 30.	Warrant 37478	311.32	
				$1,974.22

FIRST

BIENNIAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF IOWA,

FOR THE

FISCAL PERIOD ENDING SEPT. 30, 1881.

DES MOINES:
F. M. MILLS, STATE PRINTER.
1882.

Resolved, That the Board is in nowise responsible for the sentiments and opinions entertained in the following papers, prepared by special request of the Board, the respective author of each paper being responsible for its contents.—*Resolution adopted by the Board and ordered printed in the Biennial Report.*

IOWA STATE BOARD OF HEALTH,
OFFICE OF SECRETARY,
DES MOINES, November 2, 1881.

To HON. J. H. GEAR, *Governor of Iowa:*

I HAVE the honor to herewith submit the report of the State Board of Health of Iowa, through its Secretary, R. J. Farquharson, M. D., from the organization of the Board, May 5th, 1880, to October 1st, 1881.

W. S. ROBERTSON, *President.*

STATE OF IOWA,
OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
DES MOINES, November 1, 1881.

To JOHN H. GEAR, *Governor of Iowa:*

SIR—In accordance with the provisions of section 11, chapter 151, laws of Eighteenth General Assembly, the First Biennial Report of the State Board of Health, for the fiscal period ending September 30 1881, is herewith presented.

L. F. ANDREWS, *Secretary.*

MEMBERS OF THE BOARD.

‡ William S. Robertson, Muscatine, President; term expires January 31, 1881.
Wilmot H. Dickinson, Des Moines; term expires January 31, 1882.
George F. Roberts, Waterloo; term expires January 31, 1883.
Justin M. Hull, Lake Mills; term expires Jaanuary 31, 1884.
Philip W. Lewellen, Clarinda; term expires January 31, 1885.
Henry H. Clark, McGregor; term expires January 31, 1886.
Ephraim M. Reynolds, Centerville; term expires January 31, 1887.
James L. Loring, Dallas Center; term expires May 4, 1887.
* Smith McPherson, Attorney-general, *ex officio*.
L. F. Andrews, Secretary, Des Moines.
† R. J. Farquarson, Davenport.

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* Succeeds J. F. McJunkin, whose term expired January 1, 1881.
† Succeeds L. F. Andrews, whose term expired May 5, 1881.
‡ Reappointed by the Governor, January 29, 1880; term expires January 31, 1888.

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LAW OF IOWA ESTABLISHING A STATE BOARD OF HEALTH.

CHAPTER 151.

An Act to establish a State Board of Health in the State of Iowa, to provide for collecting vital statistics, and to assign certain duties to local boards of health, and to punish neglect of duties.

Be it enacted by the General Assembly of the State of Iowa:

Section 1. That the Governor, with the approval of the Executive Council, shall appoint nine (9) persons, one of whom shall be the Attorney-general of the State (by virtue of his office), one a civil engineer, and seven (7) physicians, who shall constitute a State Board of Health. The persons so appointed shall hold their offices for seven (7) years: *Provided*, that the terms of office of the seven physicians first appointed shall be so arranged by lot that the term of one shall expire on the thirty-first (31st) day of January of each year; and the vacancies thus occasioned, as well as all other vacancies otherwise occurring, shall be filled by the Governor, with the approval of the Executive Council.

Sec. 2. The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall have charge of all matters pertaining to quarantine; they shall supervise a State registration of marriages, births and deaths, as hereinafter provided; they shall have authority to make such rules and regulations and such sanitary investigations as they may, from time to time, deem necessary for the preservation or improvement of the public health; and it shall be the duty of all police officers, sheriffs, constables, and all other officers of the State, to enforce such rules and regulations, so far as the efficiency and success of the Board may depend upon their official co-operation.

Sec. 4. The clerk of the district and circuit courts of each of the several counties in the State shall be required to keep separate books for the registration of the names and post-office address of physicians and midwives, for births, for marriages, and for deaths, which record shall show the names, date of birth, death or marriage; the names of parents and sex of the child, when a birth, and when a death, shall give the age, sex and cause of death, with the date of the record, and the name of the person furnishing the information. Said books shall always be open for inspection without fee; and the clerks of said courts shall be required to render a full and complete report of all births, marriages and deaths to the Secretary of the Board of Health annually, on the first day of October of each year, and at such other times as the Board may direct.

Sec. 4. It shall be the duty of the Board of Health to prepare such forms for the record of births, marriages, and deaths as they may deem proper; the said forms to be furnished by the Secretary of said Board to the clerks of the District and Circuit courts of the several counties, whose duty it shall be to furnish them to such persons as are herein required to make reports.

Sec. 5. It shall be the duty of all physicians and midwives in this State to register their names and post-office address with the clerk of the District and Circuit courts of the county where they reside; and said physicians and midwives shall be required, under penalty of ten dollars ($10), to be recovered in any court of competent jurisdiction in the State at suit of the clerk of the courts, to report to the clerk of the courts, within thirty (30) days from the date of their occurence, all births and deaths which may come under their supervision, with a certificate of the cause of the death, and such other facts as the Board may require, in the blank forms furnished, as hereinafter provided.

Sec. 6. When any birth or death shall take place, no physician or midwife being in attendance, the same shall be reported by the parent to the clerk of the District and Circuit courts within thirty (30) days from the date of its occurence, and if a death, the supposed cause of death, or, if there be no parent, by the nearest of kin not a minor, or, if none, by the resident householder where the birth or death shall have occurred, under penalty provided in the preceding section of this act. Clerks of the District and Circuit courts shall annually, on the first day of October of each year, send to the Secretary of the State Board of Health a statement of all births and deaths recorded in their offices for the year preceding said date, under a penalty of twenty-five dollars ($25) in case of failure.

SEC 7. The coroners of the several counties shall report to the clerk of the courts all cases of death which may come under their supervision, with the cause or mode of death, etc., as per form furnished, under penalty as provided in section 5 of this act.

SEC. 8. All amounts recovered under the penalties of this act shall be appropriated to a special fund for carrying out the object of this law.

SEC. 9. The first meeting of the Board shall be within twenty days after its appointment, and thereafter in May and November of each year, and at such other times as the Board shall deem expedient. The November meeting shall be in the city of Des Moines. A majority of the members of the Board shall constitute a quorum. They shall choose one of the number to be President, and shall adopt rules and by-laws for their government, subject to the provisions of this act.

SEC. 10. They shall elect a Secretary, who shall perform the duties prescribed by the Board and by this act. He shall receive a salary, which shall be fixed by the Board, not exceeding $1,200 per annum. He shall, with the other members of the Board, receive actual traveling and other necessary expenses incurred in the performance of official duties; but no other member of the Board shall receive a salary. The President of the Board shall quarterly certify the amount due the Secretary, and on presentation of said certificate the Auditor of State shall draw his warrant on the State Treasurer *of* [for] the amount.

SEC. 11. It shall be the duty of the Board of Health to make a biennial report, through their Secretary or otherwise, in writing, to the Governor of the State, on or before the first (1st) day of December of each year preceding that in which the General Assembly meets, and such report shall include so much of the proceedings of the Board, such information concerning vital statistics, such knowledge respecting diseases, and such instruction on the subject of hygiene as may be thought useful by the Board, for dissemination among the people, with such suggestions as to legislative action as they may deem necessary.

SEC. 12. The sum of five thousand dollars ($5,000) per annum, or so much thereof as may be necessary, is hereby appropriated to pay the salary of the Secretary, meet the contingent expenses of the office of the Secretary and the expenses of the Board, and all costs of printing, which together shall not exceed the sum hereby appropriated. Said expenses shall be certified and paid in the same manner as the salary of the Secretary. The Secretary of State shall provide rooms suitable for the meetings of the Board and the office-room for the Secretary of the Board.

SEC. 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village in the State, or the trustees of any township, shall have and exercise all the powers and perform all the duties of a board of health within the limits of the cities, towns and townships of which they are officers.

SEC. 14. Every local board of health shall appoint a competent physician to the board, who shall be the health officer within its jurisdiction, and shall hold his office during the pleasure of the board. The clerks of the townships and the clerks and recorders of cities and towns shall be clerks of the local boards. The local boards shall also regulate all fees and charges of persons employed by them in the execution of the health laws and of their own regulations.

SEC. 15. It shall be the duty of the health physician of every incorporated town, and also the clerk of the local board of health in each city or incorporated town or village in the State, at least once a year to report to the State Board of Health their proceedings, and such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health.

SEC. 16. Local boards of health shall make such regulations respecting nuisances, sources of filth and causes of sickness within their jurisdiction and on board any boats in their ports or harbors as they shall judge necessary for the public health and safety; and if any person shall violate any such regulations, he shall forfeit a sum of not less than twenty-five dollars ($25) for every day during which he knowingly violates or disregards said rules and regulations, to be recovered before any justice of the peace or other court of competent jurisdiction.

Sec. 17. The board of health of any city or incorporated town or village shall order the owner of any property, place or building (at his own expense) to remove any nuisance, source of filth or cause of sickness found on private property, within twenty-four (24) hours, or such other time as is deemed reasonable, after notice served as hereinafter provided; and if the owner or occupant neglects to do so, he shall forfeit a sum not exceeding twenty dollars ($20) for every day during which he knowingly and willfully permits such nuisance or cause of sickness to remain after the time prescribed for the removal thereof.

Sec. 18. If the owner or occupant fails to comply with such order, the board may cause the nuisance, source of filth or cause of sickness to be removed, and all expenses incurred thereby shall be paid by the owner, occupant or other person who caused or permitted the same, if he has had actual notice from the board of health of the existence thereof, to be recovered by civil action in the name of the State before any court having jurisdiction.

Sec. 19. The board, when satisfied upon due examination that any cellar, room, tenement, or buildiing in its town, occupied as a dwelling-place, has become, by reason of the number of occupants, or want of cleanliness, or other cause, unfit for such purpose, and a cause of nuisance or sickness to the occupants or the public, may issue a notice in writing to such occupants, or any of them, requiring the premises to be put in a proper condition as to cleanliness, or, if they see fit, requiring the occupants to remove or quit the premises within such time as the board may deem reasonable. If the persons so notified, or any of them, neglect or refuse to comply with the terms of the notice, the board may cause the premises to be properly cleaned at the expense of the owners, or may remove the occupants forcibly and close up the premises, and the same shall not again be occupied as a dwelling-place without permission in writing of the board.

Sec. 20. Whenever the board of health shall think it necessary for the preservation of the lives or health of the inhabitants to enter a place, building or vessel in their township, for the purpose of examining into and destroying, removing or preventing any nuisance, source of filth or cause of sickness, and shall be refused such entry, any member of the board may make complaint, under oath, to any justice of the peace of his county, whether such justice be a member of the board or not, stating the facts of the case, so far as he has knowledge thereof. Such justice shall thereupon issue a warrant, directed to the sheriff or any constable of the county, commanding him to take sufficient aid, and, being accompanied by two or more members of the said board of health, between the hours of sunrise and sunset, repair to the place where such nuisance, source of filth or cause of sickness complained of may be, and the same destroy, remove, or prevent, under the direction of such members of the board of health.

Sec. 21. When any person coming from abroad, or residing within any city, town or township within this State, shall be infected, or shall lately have been infected with small-pox, or other sickness dangerous to the public health, the board of health of the city, town or township where said person may be, shall make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the persom himself, his parents, or other person who may be liable for his support, if able; otherwise at the expense of the county to which he belongs.

Sec. 22. If any infected person cannot be removed without damage to his health, the board of health shall make provision for him, as directed in the preceding section, in the house in which he may be, and in such case they may cause the persons in the neighborhood to be removed, and may take such other measures as may be deemed necessary for the safety of the inhabitants.

Sec. 23. Any justice of the peace, on application under oath showing cause therefor by a local board, or any member thereof, shall issue his warrant under his hand, directed to the sheriff or any constable of the county, requiring him, under the direction of the board of health, to remove any person infected with contagious diseases, or to take possession of condemned houses and lodgings, and to provide nurses and attendants, and other necessaries for the care, safety and relief of the sick.

Sec. 21. When any person coming from abroad, or residing within any city, town or township within this State, shall be infected with small-pox, or other sickness dangerous to the public health, the board of health of the city, town or township where said person may be, shall make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other person who may be liable for his support, if able; otherwise at the expense of the county to which he belongs.

SEC. 22. If any infected person cannot be removed without damage to his health, the board of health shall make provision for him, as directed in the preceding section, in the house in which he may be, and in such case they may cause the persons in the neighborhood to be removed, and may take such other measures as may be deemed necessary for the safety of the inhabitants.

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SEC. 24. Local boards of health shall meet for the transaction of business on the first Monday of May and the first Monday in November of each year, and at any other time that the necessities of the health of their respective jurisdictions may demand; and the clerk of each board shall transmit his annual report to the Secretary of the State Board of Health within two weeks after the November meeting. Said report shall embrace a history of any epidemic disease which may have prevailed within his district. The failure of the clerk of the Board to prepare, or cause to be prepared, and forward such report as above specified, shall be considered a misdemeanor, for which he shall be subject to a fine of not more than twenty-five dollars ($25).

SEC. 25. All laws in conflict with this act are hereby repealed.

SEC. 26. This act, being deemed of immediate importance, shall take effect and be in force from and after its passage, and publication in the *Iowa State Register* and *Iowa State Leader*, newspapers published at Des Moines, Iowa.

Approved, March 26, 1880.

I hereby certify that the foregoing act was published in the *Iowa State Leader*, April 1, and in the *Iowa State Register*, April 3, 1880.

J. A. T. HULL, *Secretary of State.*

ERRATA.

Wayne county should be added to counties in the Southern Division, on page 79.
The title of Central Division should appear over Marshall county, on page 117.
On page 79 the total population of the Northwestern Division should be 53,655.

SECRETARY'S REPORT.

Pursuant to chapter 151, laws of the Eighteenth General Assembly, the Governor, on the twenty-third day of April, A. D., 1880, commissioned the following persons to constitute the State Board of Health:

WILLIAM S. ROBERTSON, M. D.	Muscatine.
PHILLIP W. LEWELLEN, M. D.	Clarinda.
WILMOT H. DICKINSON, M. D.	Des Moines.
HENRY H. CLARK, M. D.	McGregor.
JUSTIN M. HULL, M. D.	Lake Mills.
EPHRAIM M. REYNOLDS, M. D.	Centerville.
GEORGE F. ROBERTS, M. D.	Waterloo.
JAMES L. LORING, *Civil Engineer*	Dallas Center.
JOHN F. McJUNKIN, *Attorney-general*	Washington.

MEETING OF THE BOARD.

The first meeting of the Board was held at the State-house in Des Moines, May 5, 1880. The following members were present: Dr. W. S. Robertson, Dr. P. W. Lewellen, Dr. W. H. Dickinson, Dr. H. H. Clark, Dr. J. M. Hull, Dr. E. M. Reynolds, Dr. G. F. Roberts, J. F. McJunkin, Attorney-general, and James L. Loring, Civil Engineer.

A temporary organization was perfected by the election of Dr. Lewellen, Chairman, and Dr. Roberts, Secretary, when the following persons were elected permanent officers:

President—W. S. Robertson, M.D.
Vice President, *pro tem.*—W. H. Dickinson, M. D.
Secretary.—L. F. Andrews.

Pursuant to the statute, the Board by lot arranged the terms of the members as follows; to-wit,

Dr. Robertson	*One year.*
Dr. Dickinson	*Two years.*
Dr. Roberts	*Three years.*
Dr. Hull	*Four years.*
Dr. Lewellen	*Five years.*
Dr. Clark	*Six years.*
Dr. Reynolds	*Seven years.*

Dr. Robertson, on taking the chair as permanent President, addressed the Board as follows:

PRESIDENT'S INTRODUCTORY ADDRESS.

Gentlemen—We have come together at the call of the Governor for the purpose of organizing a "State Board of Health," as provided for in chapter 151, of the acts of the Eighteenth General Assembly of the State of Iowa.

It is a subject of gratulation that the last legislature has placed our State abreast of so many of her sister States on the great work of sanitary progress, by creating a State Board of Health, which may inaugurate such measures as will materially limit the spread, and reduce the mortality of many of the diseases of the country; and, if necessary, enforce such sanitary regulations as will largely stamp out those influences which become prolific casuses of disease.

Nor, can I conceive of any office which as physicians could afford us more pleasure, and result in more good to the masses of our people than will be derived from the operation of this Board.

It is an old proverb that "forewarned is forearmed." It shall then become our duty to do much toward educating the people in the principles of hygiene and sanitary reform; to show them something of the nature and many of the causes of disease, and to impress them with the knowledge of the fact that in their manner of life, and in their every day surroundings, lie many of the means of inducing or preventing the encroachments of disease.

For the purpose of putting into efficient operation this great work, you are "called from the bed side into the broad field of sanitary labor, to consider those interests that are general and vital" to the citizens of Iowa. Let it be our endeavor, by wise and timely suggestions, to so mould popular opinion, and so instruct the masses in the elements of sanitary science, that all may recognize the wisdom of the enactment of the Health Law, and the operations of this Board as a philanthropic measure, which shall give them purer water, better drainage, better ventilated homes, more healthy food and longer life, as well as adding to their revenue the money hitherto spent in fruitless attempts to ward off disease, under a misconception of its nature and causes.

I am much inclined to believe that a large percentage of the disease of many parts of Iowa is directly or indirectly traceable to impure water supply, hence to a certain degree preventable by properly conducted sanitation. The United States census report for 1870 shows that the mortality was 492,263. "One-half of the total number of deaths were caused by the diseases due, for the most part, to miasms consequent upon soil saturation and stagnant water. More than 75,000 lives might have been saved by drainage."

The character of food, and its modes of preparation offers another important element of health-derangement.

Improper ventilation of living and sleeping apartments, and of school buildings, each and all claim annually a larger proportion of deaths than the masses are ready to acknowledge. Let us, then, on the very threshold of our labor, arrange carefully its details. Fully impressed with the responsibility of our commission, bringing to our work willing hands, and a full appreciation of its benefits, we will inaugurate a movement of incalculable benefit to the State, ere the time comes for our biennial report.

The experience of other health boards demonstrates that the work of its members is best accomplished by the appointment of standing committees on the general subjects demanding their attention. Each member selecting such subjects as are congenial to his tastes and habits of inquiry. The board thus "maps out for itself separate and distinct departments" of labor.

It is desirable that we secure the co-operation of local boards of health, as well as the services of individual scientists throughout the State, studying and investigating, as they are, so many of the subjects germane to our interest. Thus may we not only secure many valuable facts and statistics for our own use, but gain valuable media through which we may impart information to the people for the general good.

The last decade has made stalwart strides in the enlightenment of the masses in sanitary matters. Water supply, ventilation, drainage and miasm have become household words, and while perhaps not appreciated in their widest significance, they are the straws which show the direction of the popular current of thought, and are indices that the popular mind is reaching out for facts, and is grasping the progressive ideas which underlie so many of the important questions of public health.

When the people learn that many of the diseases of the country may be prevented, and the mortality lists materially abridged by the operations of this State Board of Health, they will seek further light, from all available sources, on subjects in which they feel so deep personal interest.

We can not overestimate the value and importance of popular lectures by members of this Board in different parts of the State, the discussion of the value of pure drinking water and the many contaminations of the water supply, the adulteration of food, geological formation, drainage and many kindred subjects, in which all classes of people feel an interest. The press will be only too happy to offer their columns for such information to their readers, from writers of acknowledged ability, whether members of this Board or otherwise; and we trust the Board will write all such persons who feel an interest in sanitary progress to give us such co-operation.

While it is probable that at our first meeting we shall be able to do little more than organize our Board and prepare a plan of operation, I suggest the subject of "Vital Statistics" receive early attention, inasmuch as such information must to a large extent be the basis of our operations. If we are not possessed of knowledge of the diseases and mortality of the State, we shall be ignorant as to whether we are or are not accomplishing any good.

Circulars and forms should be sent to the clerks of the courts of the different counties at the earliest moment and books opened for the "registration of physicians and midwives" of the State; also of "marriages, births and deaths," as contemplated in "section 3, of the act creating the State Board of Health."

The medical profession throughout the State will be so ready to co-operate in this work that it will be only necessary for the Secretary of the Board to invite them to furnish any information in their possession—direct or indirect—regarding the diseases of their several localities, as to insure hearty and intelligent responses, since such information will form a stock—so to speak—which will be utilized for the prevention of disease and the reduction of the mortality lists.

In conclusion, gentlemen, let me express the hope that the operation of this Board in the sanitary measures it may inaugurate and carry out, may so demonstrate the wisdom of its creation that it may prove a blessing to the whole State, and that, with advancing years it may develop a strength and influence for good which shall make Iowa one of the most salubrious, as it is one of the most prosperous, States of our confederation.

VITAL STATISTICS.

The subject of vital statistics was discussed at length, and special committees were appointed to prepare the necessary forms, for Register of births, marriages, deaths, still births, physicians and midwives, for the use of clerks of the District and Circuit Courts; also forms for returns of births, marriages, deaths, and still births, to be made by physicians, midwives, coroners, and those solemnizing marriages, to the clerk of the courts; also for records and reports of health physicians and clerks of local boards of health to the State Board of Health, of diseases dangerous to the public health.

These committees reported to the Board the result of their labor, and the following forms were adopted:

[Form 12D.]

REGISTER OF BIRTHS.

No.	*Date* of return.	1. Name of child. 2. Sex. 3. No. of child of this mother.	Race or color.	1. Date of birth. 2. Place of birth.	1. Nationality of father. 2. Place of birth.	Age.
		1 2 3		1 2	1 2	

1. Nationality of mother. 2. Place of birth.	Age.	1. Full name of mother. 2. Maiden name of mother. 3. Residence of mother.	1. Full name of father. 2. Occupation.	1. Name and address of medical attendant. 2. Name and address of person making certificate. 3. Returned by.
1 2		1 2 3	1 2	1 2 3

[Form 18D.]

REGISTER OF MARRIAGES.

1. No. of license. 2. Date of license.	1. By whom affidavit, if any, is made. 2. By whom consent to marriage given.	1. Full name of groom. 2. Place of residence. 3. Occupation.	1. Age next birthday. 2. Race or color. 3. Place of birth.	1. Father's name. 2. Mother's maiden name. 3. No. of groom's marriage.
1 2	1 2	1 2 3	1 years. 2 3	1 2 3

1. Full name of bride. 2. Maiden name, if a widow. 3. Place of residence.	1. Age next birthday. 2. Race or color. 3. Place of birth.	1. Father's name. 2. Mother's maiden name. 3. No. of bride's marriage.	1. Where and when married. 2. Witnesses. 3 By whom certified, name and office.	1. Date of return. 2. When registered.
1 2 3	1 years. 2 3	1 2 3	1 at 2 18 3	1 2

[FORM 13D.]

REGISTER OF DEATHS.

No.	Date of report.	1. Name. 2. Sex and color.	1. Age. 2. Occupation.	Date of death.				Single, married, widower or widow.	1. Nationality. 2. Where born.
				Month.	Day.	Year.	A. M. or P. M.		
		1 2 sex, color,	1 year, month, days. 2						1 2

How long resident in this State. Years.	1. Place of death. 2. Cause of death.	1. Complication. 2. Duration of disease.	1. Place of burial. 2. Date of burial.	Name and residence of physician returning certificate.
	1 2	1 2	1 2	

[FORM 15D.]

REGISTER OF STILL-BIRTHS.

No.	Date of return.	1. Name of mother. 2. Residence of mother. 3. Nativity of mother.	1. Name of father. 2. Nativity of father.	1. Sex. 2. Color.
		1 2 3	1 2	1 2

1. Date of birth. 2. Place of birth. 3. Place of burial.	1. Period of utero-gestation. 2. Cause of dead-birth.	1. Name and residence of medical attendant. 2. Name and residence of person making return.
1 2 3	1 2	1 2

[FORM 14D.]

REGISTER OF PHYSICIANS AND MIDWIVES, ... COUNTY, IOWA.

When registered.	Name. The signature of party is required.	School of practice.	Residence and P. O. address. Give St. and No. if in city or town.	Age.	Nativity.

No. of years in practice.	No. of years in practice in Iowa.	Name of medical college.	Date of graduation.	Remarks.

[Form 1E.]

RETURN OF A BIRTH.

State of Iowa, ... County. } The physician, midwife or person in attendance should immediately return this certificate, accurately filled out, to the county clerk. Penalty, $10, if not so certified and returned within 30 days.

STATE BOARD OF HEALTH.

1. Full name of child (if any)*........
2. Sex........No. of child of this mother........
3. Race or color (if not of the white race)........
4. Date and place of birth†........
5. Nationality, place of birth and age of each parent........
6. Full name of mother and maiden name........Mother's residence........
7. Full name of father........
8. Father's occupation........
9. Name of medical or other attendant and address........

Returned by........M. D.........
Dated at........18 ....Residence........

(Chapter 151, Acts Eighteenth General Assembly.)

Sec. 2. Powers of the Board.—The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall supervise a state registration of marriages, births and deaths, as hereinafter provided; they shall have authority to make such rules and regulations as they may, from time to time, deem necessary for the preservation and improvement of the public health.

Sec. 5. Duty of Physicians.—It shall be the duty of physicians and midwives in this State to register their names and post-office address with the clerk of the District and Circuit courts of the county where they reside; and said physicians and midwives shall be required, under penalty of ten dollars ($10), to be recovered in any court of competent jurisdiction in the State at suit of the clerk of the courts, to report to the clerk of the courts within thirty (30) days from the date of their occurrence, all births and deaths which may come under their supervision, with a certificate of the cause of death, and such other facts as the Board may require, in the blank forms furnished, as hereinafter provided.

Sec. 6. Report of Births or Deaths.—When any birth or death shall take place, no physician or midwife being in attendance, the same shall be reported by the parent to the clerk of the District and Circuit courts within thirty (30) days from the date of its occurrence, and if a death, the supposed cause of death, or if there be no parent, by the nearest of kin not a minor, or, if none, by the resident householder where the birth or death shall have occurred, under penalty provided in the preceding section of this act.

[Form 2E.]

RETURN OF A MARRIAGE.

1. Full name of groom........
2. Place of residence........
3. Occupation........
4. Age next birthday........years. Color........race........
5. Place of birth ....
6. Father's name........
7. Mother's maiden name.... .
8. Number of groom's marriage........
9. Full name of bride........
   Maiden name, if a widow,........
10. Place of residence ....
11. Age next birthday ....years. Color .... race........
12. Place of birth ....
13. Father's name ....

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*The given name of child should be certified, if possible, when this certificate is made, and should, in any case, be certified, and registered within a year.

†City, number, street and ward, same in towns that have them; township or precinct.

14. Mother's maiden name ....
15. No. of bride's marriage ....
16. Married at ....in the county of ....and State of Iowa, the........ day of ....18 .
17. Witnesses to marriage ....

N. B.—At Nos. 8 and 15 state whether 1st, 2d, 3d, 4th, etc., marriage of each. At 17 give names of subscribing witnesses to the marriage certificate. If no witnesses, give names of two persons who witnessed the ceremony.

........18 .

We hereby certify that the information above given is correct, to the best of our knowledge and belief.

........(Groom.)
........(Bride.)

I hereby certify that the above is a correct return of a marriage solemnized by me.

Dated at ....
this ....day of ....18 . } ....

....

☞This return is to be carefully filled out and attached to and returned with the marriage license. This return does not take the place of the certificate which comes attached to the license, but is in addition thereto.

(Chapter 151, Laws, 1880.)

Sec. 2. The State Board of Health shall have the general supervision of the interests of the health and life of the citizens. They shall supervise a state registration of marriages, births and deaths.

Sec. 4. It shall be the duty of the Board of Health to prepare such forms for the record of births, marriages and deaths as they may deem proper.

(Code of 1873.)

Sec. 2196. The person solemnizing marriage shall forfeit a like amount (fifty dollars) unless within ninety days after the ceremony he make return thereof to the clerk of the Circuit Court.

[Form 4E.]

PHYSICIAN'S CERTIFICATE OF DEATH.

State of Iowa, } ☞The physician who attended any person in a last illness
........County. } should immediately return this certificate, accurately filled out to the county clerk. Penalty $10, if not returned within 30 days.

STATE BOARD OF HEALTH.

1. Name .... Sex .... Color ....
2. Age ....years ....month ....days. Occupation ....
3. Date of death........188 ....hour........M........*Single, married, widower, widow ....
4. Nationality and place where born........
5. How long resident in this State........
6. Place of death†........
7. Cause of death‡............ | Complication........
.... | ....
.... | Duration of complication.
8. Duration of disease........

9. Place and date of burial........

Dated at........188 ....M. D.

Residence........

The attention of physicians is earnestly invited to the following list of diseases, in reference to which the particulars specified are essential to the *proper classifica-*

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*Erase such of these as are not required.

†City—No., street and ward; same in towns that have them; township or precinct.

‡State primary and immediate cause of death, and examine the list of diseases printed on cover of this book, and law pertaining to coroner's inquests.

tion of the causes of death, and consequently to the *accuracy* and *usefulness* of our statistics of mortality. It is respectfully suggested that a *negative* statement is often as important as a positive one—for instance: "ABORTION—*At two months*—METRITIS—*No cause discoverable.*" "CANCER OF STOMACH—*Not hereditary so far as known.*" "ERYSIPELAS OF HEAD—*Not of traumatic origin.*" "GANGRENE OF LEG—*No definite cause.*" "METRITIS—*Not puerperal.*" "SMALL-POX—*Patient never vaccinated.*" "OVARIAN TUMOR—*No operation,*" etc.

Abscess—Location and cause, if any.
†*Aneurism*—Vessel involved, and mode of death. Whether operation.
**Abortion and Miscarriage*—Cause, mode of death, and period of gestation.
Cerebro-Spinal Meningitis—Variety, whether probably zymotic (cerebro-spinal fever), or a simple inflammation.
Childbirth—Circumstances producing death.
Cancer—Variety and seat; whether hereditary or not.
†*Calculus*—Mode of death; whether after operation, and if so, what one.
Carbuncle—Location.
Congestive Fever—Variety.
Continued Fever—Whether simple continued fever or other variety.
Convulsions—Cause of.
Dentition—Mode of death.
Disease of Heart—Variety. Valves involved, if any.
Dropsy—Variety and cause.
Enteritis and Gastro-Enteritis—Cause, if known. Whether diarrhœal or not.
**Erysipelas*—Seat and cause. If traumatic, how produced.
**Fractures*—Cause and mode of death. (State nature of accident, etc., clearly.)
**Gangrene*—Seat and cause.
Gastric Fever—Whether remittent, typhoid, etc., or simply gastritis.
Gastritis—Whether simple, or from a definite cause.
†*Hernia*—Variety and mode of death. Whether any operation.
Insanity—Variety and mode of death.
Intermittent Fever—Variety; as quotidian, tertian, etc.
Jaundice—Cause.
Malarial Fever—Variety.
Malignant Pustule—Location and cause. Whether probably dependent on contagion or not.
Malformation (congenital)—Variety.
Metritis—Variety and cause (whether puerperal or not).
Necrosis and Caries—Seat, original cause, and mode of death.
†*Ovarian Tumor*—Mode of death. Whether operation.
Paralysis—Variety and cause.
**Peritonitis*—Variety—Whether simple, puerperal, etc.; and if the last how produced.
Phlebitis—Cause, seat and variety.
**Pyœmia*—Cause, nature of antecedent injury, if any, and how produced.
**Premature Birth*—Probable cause. Fœtal age.
Preternatural or abnormal birth—Manner of.
Small-pox—How often and when patient vaccinated, or if never.
Syphilis—Variety, chief location, and mode of death.
**Tetanus*—Whether idiophatic or traumatic. Nature of antecedent injury, if any, and how produced.
†*Tumors*—Location, variety and mode of death. Whether operation.
Ulcers—Nature, chief location and mode of death.
Uraemia—Cause of associate affection. Whether puerperal.
**Wounds*—Cause, variety, seat, and mode of death.

Mention INTEMPERANCE whenever recognized as having produced or complicated the direct cause of death. Give as many particulars as possible in instances of rare diseases, such as hydrophobia, glanders, etc.

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*Particularize any *accident or other violent cause* leading to death and *character of injury.*

†Specify *every surgical operation* with fatal results, and state the disease which necessitated it.

(Chapter 151, Acts Eighteenth General Assembly.)

SEC. 5. It shall be the duty of physicians and midwives in this State to register their names and post-office address with the clerk of the District and Circuit courts of the county where they reside; and said physicians and midwives shall be required, under penalty of ten dollars ($10), to be recovered in any court of competent jurisdiction in the State at suit of the clerk of the courts within thirty (30) days from the date of their occurrence, all births and deaths which may come under their supervision, with a certificate of the cause of death, and such other facts as the board may require, in the blank forms furnished, as hereinafter provided.

SEC. 6. When any birth or death shall take place, no physician or midwife being in attendance, the same shall be reported by the parent to the clerk of the District and Circuit courts within thirty (30) days from the date of its occurrence, and if a death, the supposed cause of death, or if there be no parent, by the nearest of kin not a minor, or, if none, by the resident householder where the birth or death shall have occurred, under penalty provided in the preceding section of this act.

[FORM 5E.]

CORONER'S CERTIFICATE OF DEATH.

STATE OF IOWA,
..............County.

The coroner should immediately return this certificate, accurately filled out, to the county clerk. Penalty, $10, if not returned within 30 days. The law applies, also, to justices, when acting as coroner.

STATE BOARD OF HEALTH.

1. Name........sex........color........
2. Age. . .year....months....days. Occupation........
3. Date of death........hour....M., *single, married, widower, widow ....
4. Nationality and place where born........
5. How long resident in this State........
6. Place of death†........
7. Cause of death‡........
8. Place and date of burial§
9. Name and place of undertaker........

Dated at................18 .
.................Coroner
Residence.......... ...

(Chapter 151, Acts Eighteenth General Assembly.)

SEC. 7. The coroners of the several counties shall report to the clerk of the courts all cases of death which may come under their supervision, with the cause or mode of death, as per form furnished, within 30 days, under penalty of $10. This law applies also to justices of the peace, when acting as coroner.

[FORM 8E.]

RETURN OF STILL-BIRTH.

STATE OF IOWA,
...............County.

STATE BOARD OF HEALTH.

The death of an infant that has breathed must not be returned as a still-birth; such deaths should be certified in the usual manner, after returning the birth record.

Name of mother........
Name of father........
Place of birth........
Residence of mother........
Period of utero-gestation........date of this birth........
Sex..........color........nativity of mother........of father........
Cause of dead-birth (if known)........
Signature of medical attendant........
Residence of medical attendant........
Name of other person making this return........
Residence of other person making this return........
Date................188
Place of burial........
...................M. D.
Residence................

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*Erase such of these as are not required.

†City—No., street and ward; same in towns that have them; township or precinct.

‡State immediate cause of death, and examine the law pertaining to coroner's inquests.

§If delivered to friends, state as the facts may be.

[Form 20D.]

RECORD OF CASES OF DISEASES DANGEROUS TO THE PUBLIC HEALTH.

Which have occurred in the........of........county of. ......State of Iowa.

Record number.	Received for record.			Full name of patient.	Sex.	Age in years last birthday.	Name of disease.
	Month.	Day.	Year.				

Taken sick.			Whether died, living or recovered.	Date of death or recovery.			Persons who furnished the facts for record.	
Month.	Day.	Year.		Month.	Day.	Year.	Name.	P. O. address.

The reported source of contagion or infection, in each case, was as follows: For the case recorded as No........

[FORM 20.]

REPORT OF CLERK OF LOCAL BOARD TO THE SECRETARY OF THE STATE BOARD OF HEALTH.

Sir: The following is a report consisting of a copy of the records of cases of diseases dangerous to the public health which have occurred in the........of....... county of........State of Iowa.

Record number.	Received for record.			Full name of patient.	Sex.	Age in years last birthday.	Name of disease.
	Month.	Day.	Year.				

Taken sick.			Whether died, living or recovered.	Date of death or recovery.			Persons who furnished the facts for record.	
Month.	Day.	Year.		Month.	Day.	Year.	Name.	P. O. address.

The reported source of contagion or infection, in each case, was as follows:—For the case recorded as No........it was. ......
I hereby certify that the above report of cases of diseases dangerous to the public health is a correct transcript from the records of this office
Dated at....................................188 . (Official signature.)..............................

[Form 10.] REPORT OF HEALTH PHYSICIAN OF LOCAL BOARD.

[Before filling any blanks, please read carefully through the entire form, including foot-notes and instructions.]

☞ DO NOT CHANGE OR MARK OUT ANY PRINTED MATTER. ☜

To the Secretary of the State Board of Health; Sir:—This annual report to the State Board of Health by the health officer of the[*]........of........county of ....State of Iowa, for the year ending October 31, 1880, consists of this form, with[a]........a report of cases of diseases dangerous to the public health,† which have occurred in this[*]........during the year above stated which is[b]........sent herewith on........separate sheet....

1. To the best of my knowledge and belief, the ratio of deaths (from all causes) to inhabitants in this[*]........during the year ending October 31, 1880, was[c] ....than the average of previous years.

2. The[d]........of the death-rate was probably due to.... ...

3. I estimate the number of inhabitants in this[*]........at[e]........; and the number of deaths from all causes at[e]........

4. The per cent of deaths to inhabitants, during the year ending October 31, 1880, was........

5. Compared with previous years, the ratio of cases of sickness (from all causes) to inhabitants in this[*]........during the year ending October 31, 1880, was[c] ....than the average.

6. The[d]........of the proportion of sickness was probably due to........

7. The greatest number of the deaths was from the diseases or causes (named in the order of greatest number) as follows:........

8. The greatest number of cases of sickness was from diseases (named in the order of greatest prevalence), as follows:........

9. The number of deaths during the year ending October 31, 1880, from disease dangerous to the public health† is as follows:‡

From small-pox.................deaths;
From cholera.................deaths;
From scarlet fever.................deaths;
From typhoid fever.................deaths;
From measles.................deaths;
From whooping-cough.................deaths;
From cerebro-spinal meningitis .deaths;
From diphtheria.................deaths;
From........ ....deaths;

10. To the best of my knowledge and belief, cases of diseases dangerous to the public health† have occurred within the jurisdiction of this board, during the year ending October 31, 1880, that have not been reported to me by the *Householder* within whose family the case occurred, or by the physician in charge of said case, as follows:‡ (*These cases are included in the statement in paragraph 12 below.*)

Of small-pox.................cases;
Of cholera.................cases;
Of scarlet fever.................cases;
Of typhoid fever.................cases;
Of measles.................cases;
Of whooping-cough.................cases;
Of cerebro-spinal meningitis .....cases;
Of diphtheria.................cases;
Of ....cases;

11. The numbers of cases of diseases on my record, which I report at this time in detail on the blank for that purpose, are as follows:‡

Of small-pox.................cases;
Of cholera.................cases;
Of scarlet fever.................cases;
Of typhoid fever.................cases;
Of measles.................cases;
Of whooping cough.................cases;
Of cerebro-spinal meningitis .....cases;
Of diphtheria.................cases;
Of ....cases;

12. Including the cases legally reported to me and those not so reported, the total number of cases of diseases dangerous to the public health,† which have occurred within the jurisdiction of this board, during the year ending October 31, 1880, were, to the best of my knowledge and belief, as follows:‡

Of small-pox.................cases;
Of cholera.................cases;
Of scarlet fever.................cases;
Of typhoid fever.................cases;
Of measles.................cases;
Of whooping-cough.................cases;
Of cerebro-spinal meningitis.....cases;
Of diphtheria.................cases;
Of ....cases;

13. The date of the first case of each disease was as follows:

Of small-pox... ....18....;
Of cholera......... .. ..18....;
Of scarlet fever...............18....;
Of typhoid fever...............18....;
Of measles.....................18....;
Of whooping-cough.. ....18....;
Of cerebro-spinal meningitis....18....;
Of diphtheria......... ... .18....;
Of ....18....;

14. The date of the last case was as follows:

Of small-pox... ....18....;
Of cholera....................18....;
Of scarlet fever..............18....;
Of typhoid fever..............18....;
Of measles....................18....;
Of whooping-cough ....18....;
Of cerebro-spinal meningitis....18....;
Of diphtheria..................18....;
Of ....18....;

15. So far as known the sources from which the diseases were derived were as follows:

Of small-pox.......................;
Of scarlet fever.................. ....;
Of measles..................... .....;
Of cerebro-spinal meningitis..........;
Of cholera ....;
Of typhoid fever.....................;
Of whooping-cough...................;
Of diphtheria ....;
Of ....

16. I attribute the........in this*........during the year ending October 31, 1880, to the following causes or circumstances:........

17. During the year ending October 31, 1880, the climatic conditions observed by me were as follows:........

18. So far as I can ascertain........fires have occurred in this........during the year ending October 31, 1880, from causes as follows:........and........lives were lost........persons injured in consequence thereof.

19. During the year ending October 31, 1880, I have attended........meetings of this board of health, and the following measures were adopted in the interest of public health:..... ..

20. Cases of diseases dangerous to the public health† now prevail at time of completing this report, as follows:

Of small-pox...................cases;
Of cholera.....................cases;
Of scarlet fever...............cases;
Of typhoid fever...............cases;
Of measles ....cases;
Of whooping-cough ....cases;
Of cerebro-spinal meningitis......cases;
Of diphtheria...................cases;
Of ....cases;

21. In my opinion the *principal sources of danger* to life or health in this* ....at the present time are as follows:........

My P. O. address is........

I hereby certify that, to the best of my knowledge and belief, the statements in the foregoing report are correct.

Dated........1880.

Signed........

*Health officer of the**... ....*of*........

County of........

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*Insert the word "township," "city," or "town."

†This is the term employed in the law. It includes all communicable diseases, whether epidemic, infectious, or contagious.

‡In filling blanks followed by such words as "deaths," "cases," etc., numbers should be stated if possible, either in words or figures, and "0" should be written where that expresses the truth; for the reason that a *blank space indicates that the item has been overlooked*, and a dash should not be used in place of a cipher, because it is usually employed to indicate that a blank which should not be filled with a figure or letter has not been overlooked.

[a] If not sent, insert the syllable "out."

[b] If not sent, insert the word "not."

[c] Insert the word "greater," "less," or "the same," as the fact may be. If much greater or less, say so.

[d] Insert "increase" or "decrease," as the case may be.

[e] Insert the number in figures.

[f] If there is absolutely no case to report, the blank form for cases need not be sent in as a part of your report. But it is important to fill all the blanks after names of diseases on this form, with ciphers if that expresses the truth to show that you have no case of each disease

[g] After each disease insert the words "the disease was contracted in the city of ....," or "at the school in......" "in a room occupied by persons sick with the same disease........(time) since," "by means of clothing worn by patient with same disease, etc., etc., as the facts may be. In the case of typhoid fever, if the privy was near the well, or within the dwelling, state the facts.

[h] Insert the words "excessive mortality," "excessive sickness," "general healthfulness;" or otherwise express the facts.

[i] Please state whether any lamp explosion has occurred, and especially mention any injuries to persons thereby.

In the foregoing report, PLEASE FILL ALL BLANKS IN SOME WAY, TO SHOW THAT NONE HAVE BEEN OVERLOOKED.

Please answer the questions as they are printed, and in the blank left for the purpose. Do NOT CHANGE OR MARK OUT ANY OF THE PRINTED MATTER.

BY-LAWS.

The following by-laws were reported by a special committee and adopted by the Board.

1. The annual meeting of this Board shall be in May of each year.

2. The President and Secretary shall be elected by ballot at the annual meeting, and shall hold their office for one year, unless sooner removed by a majority of the members present, for sufficient cause at any regular meeting, or at any meeting specially convened for that purpose.

In case of a vacancy occurring as above, it shall be competent for a majority of the members present to elect another President, or Secretary at such stated or regular meeting, to fill such vacancy until the next annual meeting.

3. The duties of the President shall be such as ordinarily pertain to the presiding officer of deliberative bodies, together with the duties as are prescribed by the act of the General Assembly creating this Board. He shall also supervise and indorse all circulars and forms used by the Board and its Secretary.

4. It shall be the duty of the Secretary to notify members of the time of holding all special and regular meetings of the Board; keep a correct record of all such meetings; supervise the preparation and issuing of all forms and circulars ordered; submit them to the President for his supervision and indorsement; and perform all other duties usually performed by such officer of State Boards of Health, or may be directed by vote of this Board.

5. The Secretary shall have his annual report ready for the inspec-

tion of the Board at its November meeting each year; and shall have a complete draft of the biennial report, together with a copy of all circulars and forms issued, or used by himself or the Board, ready at the November meeting preceding the session of the General Assembly.

6. The Secretary shall receive a salary at the rate of one thousand dollars per annum, payable as specified in chapter 151, laws of the Eighteenth General Assembly.

7. The President shall call a special meeting of the Board on the application of three members of the Board, at such time and place as may be specified.

STANDING COMMITTEES.

For the inauguration of a system whereby the work of the Board might be facilitated, standing committees were appointed, to whom were referred some of the most important sanitary and hygenic subjects. The subjects and name of the chairman of such committees are as follows:

Food, Drinks, and Water Supply—W. H. Dickinson, M. D.

Rest--Ephraim M. Reynolds, M. D.

Ventilation—Justin M. Hull, M. D.

Education—Relation of Schools to Health—Kind and Methods of Instruction in use, and Methods to be Proposed—Geo. F. Roberts, M. D.

Sewerage, Drainage, and Disposal of Excreta.—James L. Loring, civil engineer.

Influence of Slaughter-houses, Rendering-houses, etc., on Public Health.—Philip W. Lewellen, M. D.

Endemics, Epidemics, and Contagious Diseases.—Henry H. Clark, M. D.

Legislation Relating to the State Board of Health.—William S. Robertson.

CIRCULARS.

The following circular, directed to the health physician of local boards, was sent to each township and city clerk in the State, together with blank form 1C.

TO HEALTH PHYSICIANS.

FORM 8B.]

OFFICE OF THE SECRETARY
OF THE STATE BOARD OF HEALTH,
DES MOINES IOWA, October 1, 1880.

TO THE HEALTH OFFICER:

SIR—I herewith send you a blank form (1C) for your use in making your annual report to this Board, required by law,* *for the year ending October 31.*

PLEASE FILL OUT AND RETURN THIS REPORT AS SOON AS POSSIBLE.

The blank form is somewhat similar to one which we sent to the clerk of your board, but your report should be made according to your best knowledge, leaving his report to be made by him according to his best knowedge. If each of you will report the cases reported to himself we will then know the total number of cases reported, and to which class of officers the greatest number of reports are made; and if we have estimates of the probable number of cases not reported, made by two different persons in each locality, we may gain a good idea of the actual condition of the public health and of the public-health service in the different parts of the State. As soon as sufficiently accurate and complete reports are received from such a proportion of the localities as will be fairly representative, it is designed that they shall be compiled and published. General truths concerning the entire State cannot well be reached by compilation of reports when only the best, or poorest townships of many counties are represented; it is, therefore, important that every health officer shall make a report. For a similar reason, *every blank should be filled.* If no sickness has occurred within your jurisdiction, or if there has been *no case* of any disease concerning which a report is asked, it is important to state that fact, and the reason, if known, for such healthfulness, and also the population, etc., in the blank spaces provided for those statements in the report. *It is also important to fill the blanks for the probable number of cases of diseases not reported to you.* It is necessary to have uniform blank forms, because it is impossible to compile from letters and postal-cards, on account of the time required to search through them; and for this reason every fact to which this report relates should be entered in its proper place in the report.

Your report should be made out *for the exact territory over which your board has jurisdiction,* and for which you are the health officer, and it *should not include* anything outside of such jurisdiction. A township board of health *does not have jurisdiction in an incorporated town or city,* even though such city or town be situated within the limits of the township. If you have been appointed health officer for a township and an incorporated city or town, it is necessary that you make separate reports for each, just as separate as if they were made by different persons.

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* Chapter 151, laws of 1880, section 15. It shall be the duty of the health physician and also the clerk of the local board of health of every incorporated town, and also the clerk of the local board of health of each incorporated town or village, township, city, and village in the State, at least once a year, to report to the State Board of Health their proceedings, and such such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health.

Please ascertain and report, as completely as possible, the causes of all fires within your jurisdiction during the year, also the number of lives lost, and of persons injured in consequence thereof.

I send you a blank sheet for your report of cases of diseases dangerous to the public health, that you may have a knowledge of the report required. If you have more cases to report than can be reported upon one side of a sheet, please write to this office for blanks, stating the additional number of sheets you need. You will find blank spaces for this near the middle of the first page of the blank form 1C.

The blank which I send for your report of cases of diseases is recommended by this Board as a proper form for a record of such cases; to be retained in your office. Your attention is respectfully asked to chapter No. 151, laws of 1880, relative to duties of health officers of cities and towns. It is recommended that your board of health have copies of the law thoroughly distributed within your jurisdiction, in order to call attention to the law, and secure material for a complete record in your office, relating to diseases which endanger the public health.

It is not expected that it will always be possible to fill every column of your record; but so much as it is possible to learn concerning each case should be recorded and reported, because the single fact of the number of cases of sickness from each such disease will be of value in connection with the records of deaths and other knowledge collected at this office. It is hoped that you will not fail to record all cases of such diseases under your care.

In case any disease should appear in your locality as an epidemic, please make a special report of the fact to this office as soon as possible. It is also expected that you will study and record the conditions coincident with the rise, progress, and decline of any such epidemic, and in due time report the same to this Board. Concerning every such occurrence you should be able to report some facts which will be of use in advancing the cause of public health.

By direction of the State Board of Health.

Very respectfully,

L. F. ANDREWS, *Secretary.*

Please preserve and file the circulars which you receive from this office.

SLAUGHTER-HOUSES.

[FORM 6B.]

TO THE HEALTH OFFICERS OF........

Will you please send, as soon as possible, in the enclosed directed and stamped envelope, answers to the following questions:

1. Please state the name of your city.
2. How many inhabitants in your city?
3. How many butchers or meat-market men are there?
4. How many places for slaughtering animals.
5. How many animals are annually slaughtered, specifying the number of
    - *a.* Beeves—
    - *b.* Sheep—
    - *c.* Calves—
    - *d.* Hogs—
    - *e.* Other animals—

6. How many butchers do their slaughtering in one place?

7. How are the slaughter-houses situated in reference to the city limits?

8. How are they situated in reference to the thickly settled portion of the city?

9. Are any of the slaughter-houses now offensive to people living near them, or passing them?

10. Have any cases of sickness occurred fairly attributable to such causes? If so, state full particulars.

11. How are the slaughter-houses floored?

12. How are the blood, offal, and bones disposed of?

13. What is the drainage of the slaughter-houses?

14. Does the drainage from any of them go into a sewer?

15. How are they supplied with water?

16. What are the opinions of the men engaged in the slaughtering business as to the comparative economy and convenience of private separate slaughter-houses, and *one* place in which all slaughtering should be done?

FAT-RENDERING AND BONE-BOILING.

17. How many fat-rendering and bone-boiling establishments are there in your city?

18. Are any of them as now carried on offensive to the people?

19. Do they cause sickness?

20. Have any complaints been made in your city as to unwholesome meats being offered for sale?

21. Are the meats now sold in your city properly inspected before being offered for sale?

22. With respect to fat-rendering, bone-boiling, etc., what are the opinions of the men engaged in the business as to the economy and convenience of private separate places, compared with one place in which to do all such work?

A prompt reply is respectfully requested by

P. W. LEWELLEN,
Member of State Board of Health.

CLARINDA, May 20, 1880.

This circular was distributed by Dr. Lewellen as chairman of the Committee on Slaughter-houses, and his report will be found in another place.

Dr. Robertson, of the Committee on Instructions to, and Rules and Regulations for Local Boards of Health presented their report, which after general discussion was adopted. This report is embodied in the following circular:

[FORM 13B.]

RULES AND REGULATIONS FOR LOCAL BOARD OF HEALTH.

The Rules and Regulations recommended by the State Board for adoption by local boards, are as follows, to-wit:*

Rules and Regulations adopted and published by the Board of Health of...... and which will be strictly enforced bg this Board (1) for prevention of disease.

RULE 1.—No privy vault, cess-pool, reservoir into which a privy, water-closet, stable or sink is drained, except it be water tight, shall be established or permitted within fifty feet of any well, spring, or other source of water used for drinking or culinary purposes.

Reason.—Soil, especially if it be sandy loam or gravel, or clay with inclined strata or layers, is often an unsuspected conductor of the liquid contents of such receptacles to wells or springs of water. Many well authenticated cases of typhoid fever and other dangerous and often fatal diseases, have been traced to water so contaminated.

RULE 2.—Earth privies, or earth closets, with no vault below the surface of the ground, shall be excepted in Rule 1, but sufficient dry earth or coal ashes must be used daily to absorb all the fluid part of the deposit, and the entire contents must be removed monthly.

Reason.—Dry earth or coal ashes, are nearly complete disinfectants if used in sufficient quantities to absorb all the fluids.

RULE 3.—All privy vaults, cess-pools or reservoirs named in Rule 1, should be cleaned out at least once a year; and from the first of May to the first of November of each year, shall be thoroughly disinfected by adding to the contents of the vault, once every month, one or two pounds of copperas dissolved in a pailful of water.

Reason.—During the hot season prutrescent gases are given off from the decomposing excreta in such vaults. These gases are not only very offensive, but are frequently the cause of dangerous diseases. They contain compounds of ammonia, which are decomposed by solution of copperas, and the foul odor destroyed. In a family vault two pounds of copperas a month is usually sufficient. In vaults used by large number of persons, five or more pounds of copperas should be used monthly.

RULE 4.—No privy vault or cess-pool shall open into any stream or ditch, or drain, except common sewers.

Reason.—Same as for Rule 1.

RULE 5.—Within the limits thus bounded; to-wit, ... which area shall constitute the health limits of this... ....no night soil or contents of cess-pool shall be removed unless previously deodorized by mixing with a solution of copperas; and during removal the material shall be covered with a layer of fresh earth, except the removal be by the "odorless excavating process."

Reason.—Same as for Rule 3.

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*Sec. 2, Chap. 151, Laws 1880.

(1) See Chap. 151, Laws 1880, Sec. 16.

Rule 6.—All sewer drains that pass within fifty feet of any source of water used for drinking or culinary purposes, shall be water tight, and in sandy subsoil the limit shall be eighty feet.

Reason.—The danger of contaminating the water.

Rule 7.—No sewer drain shall empty into any lake, pond or other source of water, used for culinary purposes, nor into any standing water, within the jurisdiction of this board.*

Reason.—Same as for Rule 1.

Rule 8.—No garbage, materials manufactured in whole or in part of wool, silk, leather, India rubber, etc., or other materials which evolve offensive gases during combustion, shall be burned within the health limits of this corporation [or township].

Rule 9.—No house offal, or dead animals of any kind, shall be thown upon the streets, or left exposed by any person, and no butcher, fishmonger or vender of merchandise of any kind, shall leave any refuse upon the streets, or uncovered by earth upon any of the lots of this city [town or township]; and all putrid and decaying animal matter must be removed from all cellars and out-buildings on or before May first in each year.(2)

Rule 10.—All keepers of hotels, restaurants, and others, accumulating garbage, are required to have a proper covered receptacle for swill and house offal, and to cause the contents to be regularly removed as often as twice each week between the first day of May and the first day of November, and once each week at all other seasons.

Reasons same as for Rules 9 and 10.—Decomposing animal and vegetable matter are the sources of poisonous gases dangerous to public health.

Rule 11.—Between the first day of May and the first day of November no hogs shall be kept within the limits named in Rule 5, except in pens with floors, the pens to be kept entirely free from standing water, and regularly and freely disinfected; and during the months named no hogs shall be kept elsewhere within the jurisdiction of this board, within twenty-five rods of any dwelling, except in pens with dry floors, or kept free from standing water.

This board will order the removal of such animals at any time, when they appear to be prejudicial to the public health, safety or comfort.

Reason.—Same as for Rule 9 and 10.

DISEASED ANIMALS.

Rule 12.—No animal affected with an infectious or contagious disease shall be bought, sold or kept within the jurisdiction of this board. And any animal affected with glanders shall, after notice from this board, be immediately killed, and buried deep, without removing the hide from the carcass.(3)

The owner or any person having the care of any animal within the limits of this [city, town or township] knowing or having reason to believe said animal to have the disease called glanders, or farcy, shall not lead, drive, or permit such animal to go in or over any public grounds, uninclosed lands, street, road, public highway, lane or alley in this [city, town or township] or water such animal, or permit it to drink at any public water trough, pail or spring; or suffer such diseased animal to be kept in any enclosure in or from which it may come in contact with or close proximity to any other animal not affected with such disease; and such persons aforesaid, shall within twenty-four hours give notice to the health officer or the board of health of this [city, town or township] of the location of the diseased animal. And any veterinary surgeon, or any person who acts as such, who shall have knowledge of any animal diseased with glanders or farcy within the jurisdiction of this board shall, within twenty-four hours, give notice of the same to the health officer or board of health of this [city, town or township].

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*Code, Sec. 4089.

(2) Section 4089, Code of 1873.

(3) See Code of 1873, Secs. 4054-5-6-7-8.

Everything about the stable, combs and brushes or any post or fence where he has stood, and every part of harness or wagon used upon or about a glandered animal, and the stable where kept should be destroyed and burned. And all persons should use the greatest precaution against exposure from such sources.

RULE 13.—No diseased animal, or its flesh, and no decayed, diseased or unfit meat, fish, vegetables or fruit; nor diseased, impure or adulterated milk, nor other impure, diseased or adulterated article used for food, shall be sold nor offered for sale as food.(1)

RULE 14.—No dead animal shall, within the jurisdiction of this board, be put in any river, well, spring, cistern, reservoir, stream or pond.(2)

SLAUGHTER-HOUSES.

Rules and regulations for the conduct of slaughter-houses, and for rendering or bone-boiling establishments.

1. It is desirable, when practicable, and it is believed to be subservient not only to the convenience, but also to the pecuniary advantage of those engaged in the business, that all the slaughtering, as well as all the rendering, etc., should be done at one place.

2. Location of slaughter-houses, etc.:—

a. An abattoir, if thoroughly drained into a properly constructed sewer, and if no blood or offal are fed to swine on the premises, and which shall be conducted strictly according to the rules below, *may* be allowed within the limits of a town.

b. Small, separate, or private slaughter-houses should, as a rule, be outside the town or city limits, or at least in the very thinly populated portions, and not within twenty rods of any public highway.

c. They should be located on dry, hard land that can be well drained.

d. They should be amply supplied with clean, wholesome water, from springs, wells, or unpolluted streams.

e. They should be floored with a tight, solid floor of hard wood, or of cement or well-joined stone.

f. The yards, sheds, and close pens should be dry, and free from mud and filth, and their sides or walls should be thoroughly whitewashed at least twice a year.

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(1) See Code of 1873, Secs. 4035–36, 4042, 4055, 4056, 4057, 4058, and Chap. 137, laws 1880.

(2) See Code of 1873, Sec. 4041.

3. The slaughter-house and all its apparatus should be kept in a neat and orderly manner, free from all offensive smells.

a. When the slaughtering for the day is completed the sides and the floor of the slaughter-room should be thoroughly washed with an abundance of clean water. No other disinfectant will be required.

b. No animal matter of any kind should be permitted to remain in, under, or near the slaughter-house to decompose or purify.

4. When blood and offal or immature animals are fed to swine on the premises, such arrangements shall be made that such material shall be speedily consumed, and that the unconsumed portions shall be prevented from given off offensive smells, as follows:

a. The blood of all slaughtered animals should be conducted by a water-tight gutter to a water-tight trough in the hog-yard.

b. The offal and bodies of immature animals should be thrown into a pen with a tight, dry floor, to be consumed at once by the swine; and all portions not consumed within twenty-four hours should be removed from the pen, and should be burned, buried, or composted with fresh earth.

5. When the blood or offal are not fed to swine on the premises, they should every day be carted off in close tanks, and in other places treated as described in Rule 4, or should be converted into fertilizers, or otherwise utilized by an apparatus, the gases arising from which should be carried under the furnaces and be consumed.

6. The fat, and all materials from which fat or oil is to be extracted, should be rendered within such time after the slaughtering of the animals that no offensive odors shall arise from them, or from the process of rendering.

It is believed that slaughter-houses of every capacity, carried on in accordance with the foregoing rules and regulations, will be so free from offensive smells as not to be injurious to the health of any one, and justly obnoxious to the complaints of no one.

NUISANCES.

The statute, chapter 151, sections 16, 17, 18, 19, 20, laws of 1880, provides that boards of health shall make such regulations respecting nuisances, sources of filth, and causes of sickness, as they shall judge necessary for the public health and safety. If any nuisance, source of filth, or cause of sickness found on private property be not removed within twenty-four hours after notice given by the board, the board may then order the same removed.(1)

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(1) **Sec. 16. Local boards of health shall make such regulations respecting nuisances, sources of filth, and causes of sickness within their jurisdiction, and on board any boats in their ports or harbors as they shall judge necessary for the public health and safety; and if any person shall violate any such regulations, he shall forfeit a sum of not less than twenty-five [dollars] ($25) for every day during which he knowingly violates or disregards said rules and regulations, to be recovered before any justice of the peace or other court of competent jurisdiction.**

Sec. 17. The board of health of any city or incorporated town or village shall order the owner of any property, place or building (at his own expense) to remove any nuisance, source of filth or cause of sickness found on private property, within twenty-four (24) hours, or such other time as is deemed reasonable, after notice served as hereinafter provided; and if the owner or occupant neg-

In order that boards of health may act understandingly in the removal of nuisances which are injurious to the public health, it is essential that they should have a clearly defined idea of what nuisances are, which they may remove or cause to be removed. An actionable nuisance is said to be anything wrongfully done, or permitted, which injures or annoys another in the enjoyment of his legal rights. (2) Every person has the legal right to the fullest enjoyment of his life and health. Anything, then, which injuries or annoys the public in the enjoyment of life or health is a nuisance, which it is the duty of boards of health, as the guardians of the public health, to abate.(3)

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lects to do so, he shall forfeit a sum not exceeding twenty dollars ($20) for every day during which he knowingly and willfully permits such nuisance or cause of sickness to remain after the time prescribed for the removal thereof.

SEC. 18. If the owner or occupant fails to comply with such order the Board may cause the nuisance, source of filth or cause of sickness to be removed, and all expenses incurred thereby shall be paid by the owner, occupant or other person who caused or permitted the same, if he has had actual notice from the board of health of the existence thereof, to be recovered by civil action in the name of the State before any court having jurisdiction.

SEC. 19. The board, when satisfied upon due examination, that any cellar, room, tenement, or building in its own town, occupied as a dwelling-place, has become, by reason of the number of occupants, or want of cleanliness, or other cause, unfit for such purpose, and a cause of nuisance or sickness to the occupants or the public may issue a notice in writing to such occupants, or any of them, requiring the premises to be put in a proper condition as to cleanliness, or, if they see fit, requiring the occupants to remove or quit the premises within such time as the board may deem reasonable. If the persons so notified, or any of them, neglect or refuse to comply with the terms of the notice, the board may cause the premises to be properly cleaned at the expense of the owners, or may remove the occupants forcibly and close up the premises, and the same shall not again be occupied as a dwelling-place without permission in writing of the board.

SEC. 20. Whenever the board of health shall think it necessary for the preservation of the lives or health of the inhabitants to enter a place, building or vessels in their township, for the purpose of examining into and destroying, removing or preventing any nuisance, source of filth or cause of sickness, and shall be refused such entry, any member of the board may make complaint, under oath, to any justice of the peace of his county, whether such justice be a member of the board or not, stating the facts of the case, so far as he has knowledge thereof. Such justice shall, thereupon, issue a warrant, directed to the sheriff or any constable of the county, commanding him to take sufficient aid, and, being accompanied by two or more members of said board of health, between the hours of sunrise and sunset, repair to the place where such nuisance, source of filth, or cause of sickness complained of may be, and the same destroy, remove, or prevent, under the direction of such members of the board of health.

(2) Cooley on Torts, page 565; *Rex v. Watts*, 2 C. & P., 486, slaughter-house; *Rankett's Case*, 2 Rolle's Abr., 140, 141. melting stinking tallow; *Catlin v. Valentine*, 9 Paige's Ch. (N. Y.), 576, slaughter-house; *Pickard v. Collins*, 23 Barb. (N. Y. S. C.), 444, barn; Wood on Nuisances, Sec. 494.

(3) Code of 1873, Sec. 4098. "The erecting, continuing, or using any building, or other place, for the exercise of any trade, employment or manufacture, which by occcasioning noxious exhalations, offensive smells, or other annoyances, becomes injurious to the public health, comfort or property of individuals, or the public, *the causing or suffering any offal, filth or noisome substance to be collected or to remain in any place, to the prejudice of others*, the obstructing or impeding without legal authority, in the passage of any navigable river, harbor or collection of water; or the corrupting or rendering unwholesome or impure the water of any river, stream or pond; * * * * are nuisances."

Where an indictment charged that the defendant "unlawfully and injuriously did erect, continue and use a certain enclosure or pen, in which cattle and hogs were confined, fed and watered, and the

Any classification of nuisances will be necessarily imperfect; yet for the purposes of this subject, it may be said that public health nuisances are of two kinds:

1. Those which are such from their very nature, and which cannot exist in the vicinity of habitations without causing offense to the senses, and injury to the health; such, for instance, as the exposed and decaying carcasses of dead animals, or accumulations of offal or fœcal matter in exposed places.

2. Those which become nuisances by reason of the misuse or negligent care exercised of an otherwise harmless and perfectly lawful object, business, or occupation: as, for instance, slaughter-houses, rendering-establishments, mill-ponds, or burying-grounds.

The methods of procedure to be adopted for the removal of any unhealthy nuisance will vary according as the nuisance to be abated comes within one or the other of these classifications.

If a board of health find any decomposing or offensive matter upon private property, which, in their opinion, is injurious to health, they must first order the owner or occupant to remove it within twenty-four hours. If he neglects to do so they may proceed summarily to cause such nuisance to be removed. If the danger to the public health is imminent, and safety requires immediate suppression or abatement of the nuisance, the board of health, or any individual affected thereby would be protected if they proceeded at once to suppress it, for the safety of the people is the highest law. (1) But that which is exclusively a common or public nuisance cannot lawfully be abated by the private acts of an individual.(2) If any unhealthy nuisance is found in a public place, it would be the duty of the board of health to cause its immediate removal.

If a pond, a slaughter-house, or a burial-ground, or anything of a kindred nature becomes offensive and unhealthy to the community, it is the duty of the board of health to proceed at once to ask the aid of the courts to enjoin the further continuance of the nuisance and secure its abatement. Whether a business or a thing, not in itself a nuisance, is so managed or suffered to exist, as to be a nuisance, is a fact which must be determined by the courts, upon evidence. A board of health cannot decide that to be a nuisance which is not so in and of itself. Although slaughter-houses are regarded by the courts as *prima facie* nuisances, a person engaged in carrying on the business of slaughtering animals cannot be compelled to discontinue that business upon the judgment of any person, or tribunal, except that of a court of competent jurisdiction. In this way alone can a board of health

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excrement, decayed food, slops, and other filth were retained," whereby were occasioned "noxious exhalations and offensive smells, greatly corrupting and infesting the air; and other annoyances dangerous to the public health, comfort and property of the good people residing in that immediate neighborhood," it was *held*, that "the acts charged constituted a public indictable nuisance, both under this section (4089) of the statute, and at the common law." The *State v. Kaster*, 35 Iowa Supreme Court Reports, 221.

Any use of property, or any trade, that corrupts the atmosphere with smoke, noxious vapors, noisome smells, dust or other substances or gases producing injury to property, or to health, or impairing the comfortable enjoyment of property, is a nuisance. Wood on Nuisances, page 574, section 531.

(1) *Meeker v. Rensselaer*, 14 Wend., 397.

(2) *Harrower v. Ritson*, 36 Barb. (N. Y. S. C.), 201: Wood on Nuisances, Secs. 744, 515.

legally determine whether such a business is a nuisance so as to authorize them to abate it. Of course any collection of offal or filth in or about the slaughter-house may be removed by the board of health and the place may be required to be kept clean under the authority conferred by sections 17 and 18, chapter 151, laws of 1880, but the suppression of the business itself can only follow a judicial determination that it is so conducted as to be injurious to the public health.(3)

As to whether or not animals affected with a contagious disease, may be summarily destroyed, the general rule seems to be that so long as the owner restrains the animal upon his own premises, no person has the right to kill them; but if they are suffered to go at large, or if they escape from the owner's custody, the owner of the premises upon which they escape, may kill them if necessary for the protection of his own animals. (4) In the case of a horse or other animal affected with glanders, which is recognized by the courts as an incurable disease, (5) and one which may communicate all its loathsomeness and fatality to human beings, there is no question but what a board of health would be protected in destroying them wherever found, after due notice given to the owner, if in their opinion it was necessary for the public health. This protection, to the individual and to the board, would however, only be afforded in case the disease was actually the glanders, and comes under the extraordinary powers granted to the State Board, in section 2, chapter 151.

From the foregoing it will be seen boards of health are armed with power to suppress unhealthy nuisances, which they should be prompt to exercise in all cases where the public health is or will be jeopardized. While it is true an individual injured by a nuisance may, in his own behalf, institute proceedings to abate it, yet it is eminently more fitting, and it is clearly the duty of the board of health, in behalf of the community, whose guardians they are, to institute such proceedings and secure the abatement of the nuisance.

Boards of health should acquaint themselves with all the facts relating to a nuisance, carefully apply the facts to the law, that they may know how to move successfully to prevent or remove the same. In cases of doubt, legal counsel should be sought before proceeding.

The success of boards of health depends very much upon the firmness with which they enforce needful sanitary regulations, as well as the caution manifested in avoiding unnecessary exactions and investigations.

L. F. ANDREWS, *Secretary.*

For the purpose of securing uniformity of action throughout the State the foregoing rules and regulations were ordered published and distributed to all local boards of health. Copies have also been sent to the press, thus securing an extensive circulation.

Immediately after the publication of the foregoing regulations, frequent inquiry was made by local boards whether or not rules and regulations made by the State Board of Health were in force and effect upon local boards. The matter was referred to the Attorney-general who decided that "Rules and regulations made by the State Board of Health and directed to local boards of cities, towns, etc., are of full force and effect upon the people without subsequent indorsement or action of such local boards."

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(3) *Schuster v. Met. Board of Health*, 49 Barb. (N. Y. S. C.), 450: Wood on Nuisances, Secs 494, 504, 525.

(4) Wood on Nnisances, Sec. 837.

(5) Hanover's Law of Horses, p. 76.

This decision seems to be in harmony with the intent and object of the law. Local boards exist by statute without action of the persons comprising such boards, and under this decision communities are given the means of protection from contagious disease, and sources of sickness when their local boards neglect or refuse to provide thé same.

The prevalence of glanders among horses in various sections of the State, and the want of statutory provisions, to protect the people from infection necessitated some action by the State Board of Health. The foregoing rules and accompanying notes were prepared, to that end, and to inform the people more fully as to the nature of the disease, and their rights for protection under the common law. This disease is more fully set forth in a special paper in another part of this report.

At the meeting of the Board in November, the subject of contagious or infectious diseases was fully discussed, and circulars, setting forth rules for their prevention and restriction, were prepared. They have been distributed to all clerks of townships, towns and cities in the State, and extensively published by the press.

[FORM 17B.]

RESTRICTION AND PREVENTION OF SCARLET FEVER.

Scarlet fever is now believed to be one of the most contagious diseases.* One attack usually prevents subsequent attacks. The greatest number of deaths from this disease are of children under ten years of age. Adult persons do sometimes have the disease. Scarlet fever is believed to arise from a special contagium or poison which may be conveyed, to persons previously unaffected, by personal contact, by infected clothing or paper rags, or by any of the discharges from the body of a person affected with the disease.

The discharges from the throat, nose and mouth are considered extremely dangerous, and those from the skin, eyes, ears, kidneys and bowels are also dangerous, and remain so for a considerable time.

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*This disease is sometimes called "scarlatina," "scarlet rash," canker rash, etc.

Filth, all forms of uncleanliness, and neglect of ventilation increase the danger of spreading the disease.

Communication. It is believed that the disease may be communicated by a person recovering therefrom so long as the usual subsequent scaling or peeling of the skin continues.

The interval of time which may elapse after exposure to the contagium of scarlet fever, and during which a susceptible person so exposed may expect to be taken sick with the disease, varies from one to fourteen days.

Separation of the sick from the well. Whenever a child has sore throat and fever, and especially when this is accompanied by a rash on the body, the child should be immediately isolated as completely as possible from other members of the household, and from other persons, until a physician has seen it and determined whether it has scarlet fever. **All persons known to be sick with this disease should be promptly and thoroughly isolated from the public.***

The room into which one sick with this disease is placed should previously be cleared of all needless clothing, carpets, drapery, and other materials likely to harbor the poison of the disease, except such articles as are essential to the well-being of the patient. The sick room should have no carpet, or only pieces which can afterward be destroyed. Provision should be made for the introduction of a liberal supply of fresh air and the continual change of the air of the room without sensible currents or drafts.

Pocket-handkerchiefs, that need to be saved, should not be used by the patient; small pieces of rag should be substituted therefor, and after being once used should be immediately burned.

Soiled bed and body linen should be placed in vessels of water containing chlorinated soda, chlorinated lime or other disinfectant before removal from the sick room.

For this purpose chlorinated soda is the neatest and most convenient because it can be used with soap, but it is apt to lose its disinfecting properties by age. Chlorinated lime, if used too freely, may destroy articles of clothing with which it comes in contact, but if properly used it is the safest as a disinfectant.

The discharges from the patient should all be received into vessels containing "chloride of lime," copperas, or some other known disinfectant,† and the same buried at once, and not by any means be thrown into a running stream, nor into a cess-pool or a water-closet, except after having been thoroughly disinfected. All vessels should be kept scrupulously clean and disinfected.

Perfect cleanliness of nurses and attendants should be enjoined and secured. As the hands of nurses of necessity become frequently contaminated by the poison of the disease, a good supply of towels and two basins—one containing solution of chlorinated soda (Labaracque's solution), chloride of lime or other disinfecting solution, and another for plain soap and water, should always be at hand and freely used.

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*That this is of more importance than in the case of small-pox is indicated by the fact of the much greater number of cases of sickness and of deaths from scarlet fever—a disease in which there is no such preventive known as vaccination.

†Carbolic acid in dilute form, as generally used, is not believed to be a disinfectant.

Persons who are attending upon children or other persons suffering from scarlet fever, and also the members of the patient's family, should not mingle with other people nor permit the entrance of children into their house.

Funerals of those dying from scarlet fever should be strictly private and the corpse not exposed to view. To avoid mistakes *notices* of such deaths in the papers *should state* that the deceased died of scarlet fever, that there may be a full comprehension of the character of the disease. No form of scarlet fever is devoid of danger however simple the early symptoms, or trifling the course of the disease, for most serious results have followed the most simple cases.

All persons recovering from scarlet fever should be considered dangerous, and therefore **should not attend school, church, or any public assembly, or use any public conveyance,** so long as any scaling or peeling of the skin, soreness of the eyes or air-passages, or symptoms of dropsy remain. No person recovering from scarlet fever should thus endanger the public health nor appear in public until after having taken four times, at intervals of two days, a thorough bath. This *cleansing*, however, *should be deferred* until the *physician in charge considers it prudent.* After recovery from scarlet fever, no person should appear in public wearing the same clothing worn while sick with, or recovering from, this disease.

Gaseous disinfection, or fumigation, can only be completely and entirely effectual in the absence of living persons, as fumes strong enough for the purpose are destructive of human life. This need not deter from doing as much as possible, without injury to sick persons, for the purification of the air of rooms occupied by them—a liberal supply of pure air should be secured; but after the sick have recovered, the room, furniture, and other contents not to be destroyed, should be thoroughly exposed for several hours to strong fumes of chlorine gas, or to fumigation by burning sulphur; or the paper on the walls, if any, removed and burnt, the furniture scrubbed or polished, and the room thoroughly scrubbed and whitewashed.

When a room and contents are to be disinfected, all articles therein should be spread out so as to expose the greatest amount of surface to the action of the disinfectant, *and all openings to the room should be closed.*

To generate chlorine, take peroxide of manganese (to be obtained at any drug store), place in an earthen dish and add one pound of hydrochloric acid (sometimes called muriatic acid) to each four ounces of the peroxide of manganese. Care should be taken not to inhale the gas. After being certain that continuous evolution of chlorine has been secured, leave the room and close the door of exit.

The bleaching properties of chlorine may destroy the color of colored goods exposed to it, but as a disinfectant, it is one of the best.

To generate sulphurous acid gas, put live coals on top of ashes in a metallic pan, and place on the coals sulphur in powder or fragments. Of the two, sulphurous acid gas is equally efficient, and avoids the risk of bleaching colored cloths.

A convenient way is to place the coals and sulphur on a heated stove plate or cover turned bottom upward in a pan half filled with ashes. To disinfect 100 cubic feet of air requires the thorough combustion of about one and one-half ounces of sulphur.

Rooms should be kept closed and subjected to the action of the disinfecting gas for six or eight hours, and afterward thoroughly aired by opening doors and windows.

Heat as a disinfectant.—It is believed that heat sufficient to be disinfectant for this disease may be secured without destroying ordinary articles of clothing, say at 240° to 250° F.

Whenever a case of this disease occurs in a locality, prompt and vigorous action should be taken for the restriction of the disease, by early isolation of those sick with the disease, and by the destruction or disinfection of all articles likely to be infected.

Plain and distinct notices should be placed upon the premises or house in which there is a person sick with scarlet fever, and **no child that has not had the disease should be allowed to enter,** or to associate with persons who do enter such house or room.

Householders, physicians, and boards of health, have duties to the public, and in order that the guardians of the public health may have early warning, it is important that every case of scarlet fever be promptly reported to the local board of health.

"Whenever any *householder* shall know that any person within his family is taken sick with the small-pox, scarlet fever, diptheria, *or any other disease dangerous to the public health*, he shall immediately *give notice thereof to the board of health*, or to the *health officer* of the township [city or town] in which he resides; and if he shall refuse or neglect to give such notice, he shall forfeit a sum not exceeding one hundred dollars.(1)"

"Whenever any *physician* shall know that any person whom he is called to visit is infected with the small-pox, scarlet fever, diptheria, *or any other disease dangerous to the public health*, such physician shall immediately *give notice* thereof to the board of health or health officer of the township [city or town] in which such diseased person may be; and every physician who shall refuse or neglect to give such notice, shall forfeit for each offense, a sum not less than fifty nor more than one hundred dollars."*

When the small-pox, *or any other disease dangerous to the public health* is found to exist in any township [city or town] *the Board of Health should use all possible care to prevent the spreading of the infection*, and to *give public notice of infected places*, by such means as in their judgment shall be most effectual for the common safety.

Local boards of health should also make such regulations as they may deem necessary for the public health and safety respecting any *articles which are capable of containing or conveying any infection or contagion, or of creating any sickness*, or when such articles shall be brought into or conveyed from their township, or into or from any vessel; and if any person shall violate any such regulation he should forfeit a sum not less than twenty dollars.

The general laws of this State provide that the mayor and aldermen of cities and the trustees of townships "shall have and exercise all the powers, and perform all the duties, of a board of health as provided in chapter 151, laws of 1880."

The local board of health and the physicians in charge of cases of this disease should co-operate for its restriction. The local board of health should particularly guard against its spread where no intelligent physician is employed.

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*Local boards should adopt these regulations and give public notice thereof. The board, or any member thereof, may prosecute violations as provided in chapter 151, laws of 1880, Sec. 23.

All clothing, carpets, curtains, furniture and other substances that are to be destroyed should be dealt with in a way to avoid conveying the poison to any person in the process; they should not be simply thrown away, or into some stream or body of water; and if burned should be completely burned and not simply heated or dealt with in a way to diffuse the poison of the disease.

All such infected substances which are not destroyed should be thoroughly boiled, subjected to a dry heat of 250° F. in a closed room or disinfecting oven, or be thoroughly exposed to fumes of chlorine or of burning sulphur. *Books and furs* that have been handled by those convalescing from this disease *are particularly liable to convey the poison* to children who have never had the disease. Great care should be used to thoroughly disinfect any such articles that are not destroyed; and caution should be exercised before allowing children who have not had scarlet fever to handle any such articles that have been used by persons liable to communicate the disease. The Massachusetts State Board of Health state that prolonged boiling of clothing and bedding thoroughly disinfects them.

Fresh air. Although not so active for the destruction of the contagium as is chlorine or sulphurous acid gas, pure air, in liberal amount, is a very useful and important agent for the dilution and destruction of the poison of the disease; it should be employed freely; but with this as with other procedures for the safety of the unaffected, great care should be taken not to increase the danger to those already sick from any cause, who are usually endangered by exposure to drafts of cold air, and this is especially true of persons convalescing from scarlet fever.

[FORM 18 B.]

RESTRICTION AND PREVENTION OF DIPHTHERIA.

Because diphtheria has been and may be expected again to be widely prevalent, and is a formidable and fatal disease, and because it is believed to be a disease very largely preventable, the State Board of Health desires to disseminate as widely as possible among the people of this State the knowledge of certain facts and principles which seem to be well established as to the nature and causes of the disease, and the rational means for its restriction and prevention.

Nature of the disease.—Diphtheria is, primarily or secondarily, a constitutional, or blood-poisoning disease. It attacks persons of all classes and ages, but most frequently children under sixteen years of age.

In ordinary cases the poisonous principle of diphtheria probably enters the blood by way of the mouth and the air-passages.

The period of incubation of diphtheria, or the time from a person's exposure to the disease with his coming down with it, varies somewhat—being usually from a few hours to seven or eight days; in some cases, it is twelve or fourteen days.

Its most frequent local manifestations are in the mouth, throat, and air-passages. When in the mouth or upper part of the throat only, the disease is, as a rule, less dangerous and fatal, but none the less contagious, than when in the air-passages, below the fauces.

The specific contagium developed by the disease itself, and by which it spreads, is diffused by the exhalation (breath, perspiration, etc.) of the patient, through the air immediately surrounding him, as well as by clothing or other solid substances that have been brought into contact with the products of the disease.

As a rule, the virulence or malignancy of the contagium is in direct proportion to the severity of the case from which it emanates, though malignant cases may result from exposure to a mild case.

The more this contagium is allowed to accumulate in the room where the patient lies, the more powerful does it become.

Restriction of Diphtheria—**Diphtheria is a contagious disease** and hence the strict observance of the following precautions is of very great importance.

1. Every person known to be sick with this disease should be promptly and effectually isolated from the public—one or two persons only should take entire charge of the patient, and they should be restricted in their intercourse with other persons.

2. The room in which one sick with diphtheria is placed should previously be cleared of all needless clothing, carpets, drapery, and other materials likely to harbor the poison of the disease. This room should constantly receive a liberal supply of fresh air, without currents or drafts directly upon the patient. It will be well also to have the sun shine directly into the room.

3. In order that the guardians of public health may have early warning, **it is important that every case of diphtheria be promptly reported to the local board of health.**

"Whenver any *householder* shall know that any person within his family is taken sick with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, he shall immediately *give notice thereof to the board of health*, or to the *health officer* of the township [city or town] in which he resides; and if he refuse or neglect to give such notice, he shall forfeit a sum not exceeding one hundred dollars."(1)

"Whenever any *physician* shall know that any person whom he is called to visit is infected with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, such physician shall immediately *give notice* thereof to the board of health or health officer of the township [city or town] in which such diseased person may be; and every physician who shall refuse or negect to give such notice, shall forfeit for each offense, a sum not less than fifty nor more than one hundred dollars.(1)

4. **The local board of health** and the physician in charge of cases of this disease should co-operate for its restriction. The board should particularly guard against its spread by cases where no intelligent physician is employed.

"When the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, is found to exist in any township [city or town] *the board of health shall use all possible care to prevent the spreading of the infection*, and to *give public notice of infected places* by such means as, in their judgment, shall be most effectual for the common safety."

"Local boards of health should make such regulations as they may deem necessary for the public health and safety respecting any *articles which are capable of*

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(1)Local boards should adopt this regulation and give public notice thereof. The board, or any member thereof, may prosecute all violations as provided in section 23, chapter 151, laws of 1880.

containing or conveying any infection or contagion or of creating any sickness, or when such articles shall be brought into, or conveyed from their township, or into or from any vessel; and if any person shall violate any such regulation he should forfeit a sum not less than twenty dollars."(2)

"The general laws of this State provide that the mayor and aldermen of cities and towns and the trustees of townships 'shall have and exercise all the powers, and perform all the duties of a board of health.' This is in chapter 151, Sec. 13, laws of 1880."

5. The discharges from the throat nose and mouth are extremely liable to communicate the disease, and should be received on soft rags or pieces of cloth which should immediately be burned.

6. The discharges from the kidneys and bowels are also dangerous, and should be passed on old cloths and burned, or into vessels kept thoroughly disinfected by nitrate of lead, chloride of zinc, or sulphate of iron (copperas), and then *buried*, at least 100 feet distant from any well.

Copperas dissolved in as little hot water as will dissolve it is a good disinfectant for this purpose.

7. Nurses and attendants should be required to keep themselves and their patient as clean as possible—their own hands should frequently be washed and disinfected by chlorinated soda, or carbolic acid solution.

8. Soiled bed and body-linen should at once be placed in boiling water or in water containing chlorinated soda, chloride of lime, or solution of chloride of zinc.

9. All persons recovering from diphtheria should be considered dangerous, and therefore no such person should be permitted to associate with others, or to attend school, church, or any public assembly, until in the judgment of a careful and intelligent physician he can do so without endangering others.

10. The body of a person who has died of diphtheria should, as early as practicable, be placed in the coffin, with disinfectants, and the coffin should then be tightly closed. Afterward the body should not be exposed to view except through glass.

11. No public funeral should be held at a house in which there is a case of diphtheria, nor in which a death from diphtheria has recently occurred. No children, at least, and it would be better in most cases that few adults should attend such a funeral.

12. The room in which there has been a case of diphtheria, whether fatal or not should, with all its contents, be thoroughly disinfected by exposure for several hours to strong fumes of chlorine gas, or of burning sulphur, and then, if possible, it should for several days be exposed to currents of fresh air.

To disinfect an ordinary room with chlorine gas: having tightly closed all the openings of the room, place in it an open earthen dish containing four ounces of peroxide of maganese. Pour on this one pound of strong muriatic acid, being careful not to breathe the fumes. When certain that continuous evolution of chlorine is taking place, leave the room and close the door.

To generate sulphuric acid gas, put live coals on top of ashes in a metallic pan and place on the coals sulphur in powder or fragments. This is preferable to chlorine gas, for it does not bleach colored cloths and is equally efficacious.

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(2) Chapter 151, laws 1880, sections 16, 17, 18, 19, 20, 21, 22.

A convenient way is to place the coals and sulphur on a heated stove-plate or cover turned bottom upward in a pan half filled with ashes. To disinfect 100 cubic feet of air requires the thorough burning of about one and a half ounces of sulphur.

13. After a death or recovery from diphtheria, the clothing, bedding, carpets, mats, and other cloths which have been exposed to the contagium of the disease, should either be burned, exposed to superheated steam, to a degree of dry heat equal to 240 degrees F., or be thoroughly boiled.

The foregoing methods of disinfection are applicable in all contagious diseases.

Preventive Measures.—14. Avoid the special contagium of the disease.

15. Beware of crowded assemblies in ill-ventilated rooms.

All influences which depress the vital powers, and vitiate the fluids of the body, tend to promote the development and spread of this disease. Among these influences, perhaps the most common and powerful are *impure air* and *impure water*. Because of this, and as a means of lessening the danger of contracting almost all other diseases, the following precautions should always be taken, but more particularly during the prevalence of any such disease as this.

16. The grounds under and around the house should be well drained.

17. No vegetable or animal matter should be allowed to decompose on the surface of the ground near the house.

18. If any soap-factory, slaughter-house, rendering establishment, or other source of foul odors, contaminate the air which you and your children daily breathe, take immediate measures through your local board of health or health officer, to have such nuisance abated.

19. Your **own privy** especially, should at all times be thoroughly disinfected, by dry earth, coal ashes or copperas-water; and the receptacle should be so constructed as to be water-tight, and to be tightly covered when removed to be emptied, as it should be often enough to prevent the air about it from becoming offensive, and in cold weather so far as possible.

20. Your whole **house** and especially its sleeping-rooms **should be well ventilated.**

21. Your **cellar should be dry** and well ventilated, it should frequently be whitewashed and always kept clear of decomposing vegetable or other substances.

22. No cess-pool should be allowed near the house. If there be one, it should either be removed or be thoroughly and frequently disinfected with sulphate of iron (copperas).

23. Your **house drains** should be looked to with scrupulous care, to see that they are well trapped, kept clear and ventilated into the open air. This ventilation may be secured by a one and one-half inch iron pipe, connected with the sewer pipe between the trap and the main sewer, carried along the chimney or otherwise to the top of the house. This will overcome all difficulties from the inefficiency of traps through overflow of the sewer, or back-water; and also the

changes of current or draft in chimneys, where the ventilation pipe is simply carried into the chimney at the bottom. If placed inside the chimney it should be carried to the top of the chimney. The latter method is the most desirable mode of ventilation.

24. Your house should not have uninterrupted connection with a sewer. Be sure that the waste-pipes do not permit the entrance of sewer gas into the house, but that they enter the sewer through an open-air space, or at least through a space freely ventilated to the open air.

25. Be sure that your **drinking water** is not contaminated by surface drainage nor by leakage from the drain, gas-pipes, sewer, cess-pool or vault.

In order that the document may do the greatest possible good, it is hoped that each one who receives it will not only make such use of it as will tend to disseminate most widely the suggestions and statements of fact contained therein, but will also *act for the restriction or prevention of this disease* in accordance with its suggestions, or by other effective measures.

[FORM 21B.]

RESTRICTION AND PREVENTION OF SMALL-POX.

Nature of the disease.—Small-pox is prevalent in many parts of the State. It is a part of the history of the disease that it occurs in certain intervals, at periods not absolutely accurate or well defined, but sufficiently distinct to attract attention. This periodicity is largely due to changes in population, rather than any inherent law of the disease. It is formidable and fatal, and believing it to be preventable, the State Board disseminate as widely as possible, among the people of the State, the knowledge of rational means for its restriction.

The specific contagion developed by the disease itself, and by which it spreads, is diffused by the exhalations (breath, perspiration, etc.) of the patient, through the air immediately surrounding him, as well as by clothing or other solid substances that have been brought into contact with the products of the disease.

As a rule, the virulence or malignancy of the contagion is in direct proportion to the severity of the case from which it emanates, though malignant cases may result from exposure to a mild case.

The State Board of Health have adopted and issued the following regulations:

Restriction of the disease.—**Small-pox is a contagious disease,** and hence the strict observance of the following precautions is of very great importance.

1. In order that the guardians of the public health may have early warning, it **is important that every case of small-pox be promptly reported to the local board of health.**

"Whenever any *household* shall know that any person within his family is taken sick with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health,* he shall immediately *give notice thereof to the board of health,* or to the *health officer* of the township [city or town] in which he resides; and if he shall refuse or neglect to give such notice, he shall forfeit a sum not exceeding one hundred dollars." (1)

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(1) Local boards should adopt this regulation and give public notice thereof. The board, or any members thereof, may prosecute all violations as provided in section 23, chapter 151, laws of 1880.

"Whenever any *physician* shall know that any person whom he is called to visit is infected with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, such physician shall immediately *give notice* thereof to the board of health or health officer of the township [city or town] in which such diseased person may be; and every physician who shall refuse or neglect to give such notice, shall forfeit for each offense, a sum not less than fifty nor more than one hundred dollars.

2. **The local board of health** and the physician in charge of cases of this disease should co-operate for its restriction. The board must particularly guard against its spread by cases where no intelligent physician is employed.

"When the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, is found to exist in any township [city or town] *the board of health shall use all possible care to prevent the spreading of the infection*, and to *give public notice of infected places* by such means as in their judgement shall be most effectual for the common safety."

"Local boards of health must make such regulations as they may deem necessary for the public health and safety respecting any *articles which are capable of containing or conveying any infection or contagion or of creating any sickness*, or when such articles shall be brought into, or conveyed from, their township, or into or from any vessel; and if any person shall violate any such regulation he shall forfeit a sum not less than twenty dollars."

The general laws of this State provide that the mayor and aldermen of cities and towns and the trustees of townships, "shall have and exercise all the powers, and perform all the duties of a board of health." *Chapter 151, section 13, laws of 1880.*(2)

3. Upon notice being given of cases of small-pox or varioloid to the board of health of a township, city or town, or to the health physician thereof, or whenever any member of said board, or the health physician shall have knowledge of any cases of small-pox or varioloid within their jurisdiction, some member of the board, or the health physician, shall cause a *yellow* cloth, or card having small-pox conspicuously printed thereon, not less than six inches square to be fastened upon the front door, or other conspicuous place of each building in which sickness prevails, said cloth or card to be maintained during the existence of the disease, and until such time as the health physician is satisfied the premises have been properly cleaned, disinfected and purified. If said yellow cloth or card is removed without authority from the health physician, the name of the person, or the head of the family, occupying the premises, together with the number of the street or location, shall be published, and the person removing said cloth or card, or causing their removal without authority of the health physician, shall be fined a sum not less than fifty nor more than one hundred dollars.

4. Every person affected with small-pox or varioloid, shall be isolated as much as possible from all other persons, and shall occupy a room in which there are no unnecessary articles of furniture, as carpets, cushioned chairs, lounges, window curtains, clothing, etc. The rooms which have been occupied by such diseased

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(2) **The Attorney-general decides that section 13 is mandatory, and it makes it compulsory upon the officers therein named to perform all the duties of a board of health, in accordance with the object and intent of the law. A refusal or neglect to comply with the statute renders them liable to indictment for misdemeanor.**

person should, if papered, have the paper removed entirely from the walls; the walls should be whitewashed; the floor scrubbed; the room thoroughly fumigated, disinfected and ventilated before permission is granted to remove the yellow cloth or card of warning.

5. No person recovering from small-pox shall be permitted to appear on the public streets of any city or town, or the public highway of any township, or in any public place, until he or she is provided with a certificate from the attending physician, or health physician of the board of health, of such township, city or town, that all danger from contagion, by reason of such disease, is passed.

6. Every person dying of small-pox should be thoroughly washed with a zinc solution, of double strength, then be wrapped in a sheet wet with the zinc solution placed in as tight coffin as possible, and buried immediately.

7. No public funeral shall be held at a house where there is a case of small-pox or varioloid; nor in which a death from small-pox has recently occurred.

8. The room in which there has been a case of small-pox or varioloid must be thoroughly disinfected immediately.

*Instructions for disinfection.** 9. It is extremely important that the people should be instructed with regard to disinfection. They must be taught that no reliance can be placed on disinfectants simply because they smell of chlorine or carbolic acid, or possess the color of permanganate, and that, in general, proprietary disinfectants with high sounding names are practically worthless, as they either have no value whatever, or if of value cost many times as much they are worth, and cannot be used in sufficient quantity.

Disinfection is the destruction of the poisons of infectious and contagious diseases.

Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odor.

Disinfection cannot compensate for want of cleanliness or of ventilation.

10. **Disinfectants to be employed.**—1. Roll sulphur (brimstone) for fumigation.

2. Sulphate of iron (copperas) dissolved in water in the proportion of one and and a half pounds to the gallon; for soil, sewers, etc.

3. (Zinc solution) sulphate of zinc and common salt, dissolved together in water in the proportions of four ounces sulphate and two ounces salt to the gallon; for clothing, bed-linen, etc. (3)

11. **How to use disinfectants in the sick-room.**—*The most available agents are fresh air and cleanliness.* The clothing, towels, bed-linen, etc., should at once, on removal from the patient, and before they are taken from the room, be placed in a pail or tub of the zinc solution, *boiling hot*, if possible.

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*Prepared by the National Board of Health.

(3) NOTE.—Carbolic acid is not included in the above list for the following reasons: It is very difficult to determine the quality of the commercial article, and the purchaser can never be certain of securing it of proper strength; it is expensive, when of good quality, and experience has shown that it must be employed in comparatively large quantities to be of any use; it is liable by its strong odor to give a false sense of security.

All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution.

Unnecessary furniture—especially that which is stuffed—carpets and hangings, when possible, should be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.

12. **Fumigation** with sulphur is the only practical method for disinfecting the house. for this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon bricks placed in wash-tubs containing a little water, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionately increased quantities.

13. **Premises.**—Cellars, yards, stables, gutters, privies, cess-pools, water-closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containg about sixty pounds of copperas in a barrel of water, or by dissolving in hot water a few pounds of copperas.

14. **Body and bed clothing, etc.**—It is *best* to burn all articles which have been in contact with persons sick with contagious or infectious diseases (and especially if the disease be small-pox). Articles too valuable to be destroyed should be treated as follows:

a. Cotton, linen, flannels, blankets, etc., should be treated with the boiling-hot zinc solution, introducing piece by piece; secure thorough wetting, and boil for at least half an hour.

b. Heavy woolen clothing, silks, furs, stuffed bed-covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their surfaces thoroughly exposed, and pockets being turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

15. To disinfect an ordinary room with chlorine gas: having tightly closed all the openings of the room, place in it an open earthen dish containing four ounces of peroxide of manganese. Pour on this one pound of strong muriatic acid, being careful not to breathe the fumes. When certain that continuous evolution of chlorine is taking place, leave the room and close the door.

Preventive measures.—The only safety against small-pox is, to-wit:

16. **Avoid the special contagion of the disease, and vaccinate.**

17. **Vaccination.**—When successfully performed, with reliable virus, vaccination undoubtedly modifies, if it does not furnish absolute protection from small-pox; but in view of the fact that there are many instances in which the vaccine disease (for some cause) does not pass regularly through all its stages, thereby

becoming a spurious vaccination, the State Board earnestly recommend the **re-vaccination of all persons, old and young, who are not known to have been successfully vaccinated** at some former time. More especially should this precaution be taken during the prevalence of small-pox in a neighborhood. By the observance of this rule, and primary vaccination in youth, one of the most loathsome diseases may be effectually prevented. The State Board, therefore, strongly recommends vaccination. For this purpose non-humanized virus, or that taken directly from the cow, is most reliable, and is recommended. If that cannot be obtained, humanized virus, obtained from the arm of a healthy child, may be used. Properly done, with due precaution as to the health, vigor and age of the subject, and the source of the virus used, vaccination may be affirmed to be without danger.

18. In vaccine disease, or cow-pox, the period of incubation or development from exposure to eruption is four to six days; in small-pox it is seven to fourteen days. Hence, if vaccine virus be inserted immediately after exposure to small-pox, its shorter incubative period will anticipate the other, and if it do not prevent it altogether will so modify it as to deprive it of its greatest danger. **Immediate vaccination after exposure is important for safety.**

In order to secure a better understanding of the powers and duties of local boards, the State Board at its meeting in November, 1881, authorized the publication of the following circular:

[FORM 14B.] CIRCULAR TO CLERKS AND HEALTH PHYSICIANS OF LOCAL BOARDS.

OFFICE OF THE SECRETARY
OF THE STATE BOARD OF HEALTH,
DES MOINES, November 12, 1880.

Reports from officers.—An examination of the blanks for reports of this Board will show that provisions are made for placing upon record a great many statements of conditions existing within the jurisdiction of the several local boards of health in Iowa, and also the facts relative to the prevalence and fatality of certain diseases. A large number of these have been filled out and returned to this office by clerks of local boards, and thus much material collected which will eventually be of value in forming conclusions as to the conditions which, favorably or unfavorably, influence health and disease.

This is not accomplished, when properly done, without considerable labor by clerks and others who contribute to this collection. Many clerks report that the trustees or council have never met, nor organized as a board of health, and hence it would seem these clerks of local boards have performed these duties without reference to compensation.

A large amount of correspondence is forced upon the office of the State Board by the reluctance of township trustees and city councils, and of local boards to comply with the law. The statute is very plain.*

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*Chap. 151, Sec. 15, Laws 1880.

SEC. 15. It shall be the duty of the health physician of every incorporated town, and also the clerk of the local board of health in each city or incorporated town or village in the State, at least once a year to report to the State Board of Health their proceedings, and such other facts required *on blanks* and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health.

The health physician.—Although the law provides for reports from health physicians of all local boards, reports have not been received with much regularity or uniformity. In fact, a large majority of blanks intended for health physicians are returned by the clerk in direct contravention of the instructions accompanying each blank. Form 1C is intended exclusively for the health physician, and form 2C exclusively for the clerk. By circular issued from this office in June, clerks were requested to send notice to this office at once of the appointment of health physicians by their local boards, giving their name and post-office address. This instruction has been very extensively ignored or forgotten. Hence, information of value, so far as it relates to diseases and causes of death, which could be obtained more fully and satisfactorily from such physicians if they were appointed, as they should be, has not been, and could not be procured. The duty of local boards relative to the appointment of a health physician is imperative. The law is mandatory, not advisory. It says they *shall* appoint one.

SEC. 14. Every local board of health *shall* appoint a competent physician to the board, who shall be the health officer within its jurisdiction, and shall hold his office during the pleasure of the board.

Clerks of local boards.—The statute requires every clerk of a township, city or town, to make a report, as clerk of the local board of health, to the State Board, whether there has been organized in the city, town or township, a board of health or not, or without reference to whether he has, or has not, received any notice of contagious diseases, or reports from those who should report to him. It is expected the clerk will ascertain in some manner the "facts required," and report them as accurately as possible. Yet clerks persist in returning their blanks not filled out, and with them a letter saying: "No cases have been reported to this office, and I have nothing to report." They will then go on to say: "There have been no epidemic diseases in this township the past year; no deaths. The health generally of the people, owing to general cleanliness, pure air, good water and drainage, has been unusually good." Now, this conveys very much of the intelligence desired on the blanks, and it should be placed there, so that it could be properly filed and readily referred to. To read all such letters involves time, and to keep trace of letters, scraps of paper and postal cards, is nearly impossible. Some clerks neglect to insert the name of their city, town or township, giving only their name; and the post-office stamp, which is very uncertain in most cases, is the only means of ascertaining where the return came from. Some give the name of the location, but omit their signature and post-office address.

Some clerks return the blanks not filled out, but write, saying: "There is no board of health in this city [or township]." In every city, town or township in the State there exists by law a local board of health.

SEC. 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village in the State, or the trustees of any township, *shall* have and exercise all the

powers and perform all the duties of a board of health within the limits of the cities, towns and townships of which they are officers.*

Local boards of health, therefore, existing by positive enactment, the clerks of such boards are required to report to the State Board, whether the officers of the city, town or township, perform their duty or not. The framers of the law evidently presumed the clerk of a township has, necessarily, some general knowledge of the conditions and occurrences in his own township, and it is reasonable to suppose, although no official report has been made to him, his facilities for obtaining information in his township are such as to enable him to make a very full and satisfactory report of the facts as they exist. The blanks are so arranged that when he cannot give positive information he may give his opinion, based on his knowledge and best judgment. If clerks will bear this in mind, and so make their returns *on the blanks*, they will save a vast amount of trouble and labor in the office of the State Board, and materially aid the cause for which the law was established. It should be remembered that there are over three thousand clerks in the State, and irregularities which may seem trivial in a single case amount to considerable in the aggregate. They should bear in mind, also, that it is just as important to report the fact that no sickness or deaths have occurred as to report a large number. This information is important to this office as showing when and under what conditions there is exemption from diseases. The object of the State Board is to ascertain why diseases are more prevalent in one locality than another, and, if possible, remove the causes where they exist. With the hearty, prompt co-operation of local boards it is possible to do much, if only the need therefor is made plain.

The reports of clerks of local boards are a part of the records of the State Board, as a part of the lasting records of the facts to which they relate in the several cities, towns and townships of Iowa, at the time they were made, to be kept for future reference and comparison with future conditions which arise respecting their locality. This fact alone should stimulate clerks and officers of local boards to contribute all that is possible to be obtained, so that when it is wanted it will be valuable and reliable, and furnish a firm foundation on which to build up knowledge which shall aid to prevent sickness and death. Therefore, make your report on the blanks furnished by the State Board, whatever it may be, and send nothing on postal cards, scraps of paper, or by letter, pertaining to health, unless it be as a special report, when the regular report is not due, *and report only cases of contagious diseases at any time. Do not use the health physican's blank which is Form 1C.*

Where a township clerk is also clerk of a city or town, he must keep a separate record for each, and so report to this office.

The clerk's records.—Many clerks inquire how they are to obtain the reports of cases of contagious diseases, with which to make the record. The law gives the local boards power to make such regulations regarding the cause of sickness as they deem necessary.

***Chap. 151, Sec. 13, Laws 1880.**

SEC. 16. Local boards of health shall make such regulations respecting nuisances, sources of filth and *causes of sickness* within their jurisdiction, and on board any boats in their ports or harbors, as they shall judge necessary for the public health and safety; if any person shall violate any such regulations, he shall forfeit a sum of not less than twenty-five dollars ($25) for every day during which he knowingly violates or disregards said rules and regulations, to be recovered before any justice of the peace or other court of competent jurisdiction.*

It is clearly the object of the law, and duty of local boards under the law, to protect the people from the ravages of contagious diseases, and they should possess the earliest possible moment information of the presence of such diseases within their jurisdiction. The State Board of Health, therefore, recommend the adoption of regulations by local boards; to-wit.

Whenever any physician shall know that any person whom he is called upon to visit, is infected with small-pox, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice thereof to the board of health or health physicians of the city, town, or township (as the case may be) in which such diseased persons may be.

Whenever any householder shall know that any person within his family is taken sick with small-pox, scarlet fever or any other disease dangerous to the public health, he shall immediately give notice thereof to the board of health or to the health physician of the city, town or township (as the case may be), in which he resides, and, until instructions are received from the board of health or the health physician, no clothing or other articles that may have been exposed to infection, shall be removed from the house until thoroughly disinfected.†

The penalty for violation of these regulations should be such as would secure compliance therewith, and appear to be fixed by the last clause of section 16, chapter 151, laws of 1880.

These regulations should be given extensively to the public, and it is believed that so soon as the people thoroughly understand that it is absolutely essential to the proper protection of the community that prompt notice be given of contagious and dangerous diseases, they will not hesitate to take all possible means to protect their neighbors from the danger of suffering and death.

When the board of health has received notice of dangerous diseases, their duties have just begun. They should act promptly and vigorously to thoroughly restrict and prevent any further spread of the disease. To this end the State Board has adopted rules and regulations which will be sent to all local boards of health.

Immediately on the outbreak of an epidemic, notice should be given by the clerk to this office, in order that its progress and decline may be studied. The health physician should also make careful study of epidemics within his jurisdiction, and report all facts to the State Board. Where there is a town or city within a township, the township board has no jurisdiction in such city or town.

Records.—Local boards of health should keep a record of all proceedings separate and distinct from all proceedings as city council, or township trustees, as their organization as board of health is under a special law, and the legality of their proceedings can only be shown as evidenced by record. These records may be obtained of blank book makers throughout the State generally, made from forms prepared by the State Board at one dollar per quire, bound with a record for proceedings in front, and for contagious diseases in the back. The health physician should also be supplied a record like the clerk's, in which to record the history and cases of contagious diseases. Cities and incorporated town boards of health may adopt the ordinances of their city or town as the regulations of their board, and the person who violates the regulations of a local city or town board, when so adopted, may be said to commit two offenses, one against the ordinances of the city, and one against the laws of the State, and the prosecution for a violation of the regulations may be by the city, and in its name; or by the board, or by any member thereof, under the State law.

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*Chap. 151, Sec. 16, Laws 1880.

†These rules are based on the regulations adopted by the board of health of Wakefield, Massachusetts.

All fines and penalties recovered for violation of chapter 151, laws of 1880, are, in the opinion of the Attorney-general, like all other fines and penalties, to be paid into the county treasury and set apart as a special fund for the benefit of the township where recovered.

Expenses of local boards.—Many clerks have written this office inquiring how the expenses of local boards are to be paid. While it is true chapter 151 makes no provision for the expenses of township boards of health, the Code of 1873 makes ample provision therefor. Local boards have power under section 14, chapter 151, laws of 1880, to regulate all fees and charges of persons employed by them in the execution of the health laws and of their regulations. The Attorney-general decides that sections 420 and 3808, are not affected by the repealing section 25, chapter 151, laws of 1880, and are still in force; to-wit,

SECTION 420. All expenses now or hereafter incurred by the trustees of a township in the exercise of the powers heretofore or herein conferred, shall be borne by the township. The trustees shall certify the amount required to pay such expenses to the board of supervisors of the county, and that board. shall at the time it levies the general taxes, and in addition thereto, levy on the property of the towhship a sufficient tax to pay the amount so certified by the trustees. The tax so levied shall be collected by the county treasurer with other taxes, and be by him paid over to the township clerk. (Code 1878.)

SEC. 3808. The township trustees shall receive:

For each day's service of eight hours necessarily engaged in official business, to be paid out of the county treasury, to each trustee, two dollars. (Code 1873.)

The certificate or the amount required to pay the expenses of the board may be in the following form, and should be signed by all the trustees of the township:

............county, Iowa, } ss
..............township. }

To the Board of Supervisors of............county, Iowa:

We, the undersigned, trustees of said township, hereby certify to the board of supervisors of said county, that we, as a board of health of said township, have made regulations for the protection of the public health of said township, and that the expenses now and hereafter to be incurred in the exercise of our powers as such board of health is $ ..., and we request you at the time of the levy of the general taxes, and in addition thereto, to levy on the property of said township a sufficient amount to pay said sum or so much thereof as may be necessary in addition to the penalty fund set apart for this township, as provided in Sec. 8, chapter 151, laws of 1880.

A—— B——
C—— D——
E—— F——
Trustees.

Dated......day of.......18....

Duties and power of health physicians.—The health physician of a local board is not a member of the board. His powers and duties, when not expressly stated in the statute, are only such as are conferred by action of the board. They should, therefore, be fully and clearly defined, that his action in enforcing the regulations of the board may be of legal force and effect. He is the advising counsel of the board in sanitary matters. When appointed for more than one city, town or township, he must make a separate report for each to the State Board.

Notice of regulations.—All regulations adopted by a township board of health should be published or posted. The rule for this is found in section 416 of the Code of 1873, which, in the opinion of the Attorney-general, is in force; to-wit,

> "Notice shall be given of all regulations made by publishing the same in a newspaper published in the township, or where there is no newspaper, by posting in five public places therein."

A large number of clerks nave notified this office that the township trustees and city or town councils have not organized as a board of health, or that they have met and adjourned without adopting any regulations or rules. Section 24, Chap. 151, laws of 1880, says local boards *shall* meet for the transaction of business in May and November of each year, and section 16 says they shall make such regulations respecting nuisances and causes of sickness as they shall judge necessary for the public health. The presumption of the law is that they will perform all the duties contemplated by the statute to protect the community within their jurisdiction from contagious and infectious diseases, and from all causes of sickness within their power. Short of this, they have not complied with the object and intent of the law. To assume that contagious and dangerous diseases or causes of sickness do not exist, is no assurance that they will not exist, and the people for whose benefit the laws were enacted have the right to demand that the proper authorities shall perform their duty and afford them the immunities contemplated by the statute for their restriction and prevention.

Correspondence.—In returning blanks to this office, be careful to insert the name of your township and county, and sign your name, with post-office address, *place the blank in an unsealed envelope, affix a one cent stamp and address it to* "State Board of Health, Des Moines, Iowa."* In writing to this office, always give your post-office address, township and county, as there are many townships of the same name in different counties, and post-office stamps are frequently illegible.

Preserve all circulars received from this office and deliver them to your successor in office.

In ordering blanks or circulars from this office, give the number of the form, and then you will get just what you want.

Very respectfully,

L. F. Andrews,
Secretary.

By order of the State Board.

Immediately after chapter 151, laws of 1880, went into effect, numerous inquiries were made, as to how the expenses of local boards were to be paid, said chapter making no provision therefor. The following letter was sent to the Attorney-general requesting his opinion thereon:

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*Since this circular was issued the Post-office Department has decided that blanks partly printed and partly written are subject to letter postage.

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
June 24, 1880.

J. F. McJUNKIN, *Attorney-general:*

DEAR SIR: I desire your opinion respecting the expenses of local boards of health under section 14, Chap. 151, laws of 1880. The law is mandatory, requiring the performance of certain duties. No provision is made for compensation for such service. The law also provides, in sections 16 and 17, for the recovery of certain penalties, but does not say to whom such penalties shall be paid when recovered. Is it not the presumption of law that all fines and penalties recovered under this law before justices of the peace and other courts shall be paid into the county treasury?

I find our board of health law is nearly identical with Sec. 415 *et seq.* of the Code of 1873. Section 420, you will see, provides how the expenses of township trustees, acting as a board of health, shall be paid. Section 3808 provides that such trustees, when engaged in official business, shall receive two dollars per day, to be paid out of the county treasury.

The repealing clause of Sec. 25, Chap. 151, laws of 1880, repeals only so much of existing laws as in conflict therewith. I am of the opinion Secs. 416 and 420 of the Code are still in force.

In reply to the foregoing the following was received:

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE ATTORNEY-GENERAL,
WASHINGTON, June 28, 1881.

L. F. ANDREWS, *Secretary State Board of Health:*

DEAR SIR:—Your ideas as to how the township trustees are to be paid are correct. The expenses of local boards of health are to be borne as other expenses of the township. The fines and penalties are, like all fines and penalties, to be paid into the county treasury.

Respectfully yours,

J. F. McJUNKIN.

SEWERAGE, DRAINAGE AND DISPOSAL OF EXCRETA.

The records of the Registrar-General show that in England and Scotland the life of the people gains from twenty to twenty-five per cent in five years, and suffer less than half the average sickness and disability in the well drained districts. Based upon computations made from the vital statistics of sixty-three of the healthiest districts in England, Dr. William Farr says: "Industry and the army receive their best recruits from this population, while they get their worst from the low parts of sickly towns." Very little drainage has been done in Iowa, except to increase the product of land, yet, wherever drainage is profitable in a monetary direction, it is equally profitable in a hygienic direction to all animal life living upon the land.

Diseases, caused more or less by defective drainage, are malarial fevers, dysentery, enteric (typhoid) fever, diphtheria, cerebro-spinal meningitis, cholera Asiatica, and phthisis pulmonalis (consumption). Enteric fever may be said to live on the decomposition of animal and vegetable matter, and the dissemination in the air and water, of animal excrement, while a milder form of the disease, known as typho-malarial, is induced by decomposing wood, rotting building-sills and cellar-floors, and decaying vegetables.

To secure information from different sections of the State for the use of the Committee on Drainage, Sewerage and Disposal of Excreta, and for dissemination of information among the people upon these very important subjects, the following circular was issued:

Dear Sir—In the preparation of a paper upon Healthful Homes, for the State Board of Health, the Committee on Sewerage, Drainage, and Disposition of Excreta, is desirous of obtaining information upon the following points, and will feel under obligations to those correspondents of the Board who will consider them and communicate with the Committee:

1. What is the nature of the soil and the geological formation in your location?

2. What is the practice in your neighborhood in regard to the use of tile-draining the ground upon which the dwelling is erected?

3. What, in your opinion, is required to render a house and its surroundings healthful in your locality?

4. What has been your experience in regard to the location of dwellings in your vicinity as regards immunity of families from different forms of disease?

5. From what source do the inhabitants obtain their drinking water, and that used in cooking? If from wells, what is their average depth? In what manner are they constructed? Are they liable to receive surface water?

6. Do the houses usually have cellars, and if so, are they walled with stone, ventilated, clean, and free from water?

7. What is the usual mode of disposing of the animal excrement, or fœcal and urinary matter?

8. What is the usual mode of disposing of waste water and kitchen wash?

9. Please give your views upon any matters pertaining to the construction and maintenance of sewers and drains.

N. B.—Please forward your reply within two weeks, if convenient, to

James L. Loring,
Civil Engineer Iowa State Board of Health.

Dallas Center, Iowa, May 20th, 1880.

At the November meeting Mr. Loring, of the Committee on Sewerage, Drainage and Disposal of Excreta, presented a report which was adopted and twenty-five hundred copies ordered printed for distribution. The report is given in another part of this report.

WATER SUPPLY.

The collection of facts from the State at large relating to the water supply is recognized as of great importance, and to inaugurate a plan which will be enlarged in its scope as the years go on, the following circular was issued by the Committee on Water Supply, and sent to the principal cities of the State:

DES MOINES, June 10, 1880.

DEAR SIR:—The State Board of Health desire information regarding the water supply of cities in this State. Will you answer the following interrogatories relative to your city:

1. What is the source of water supply?
2. Is the water filtered before entering pipes?
3. Are there any sources of contamination above the main pipes, as sewers, drainage from woolen-mills, slaughter-houses, etc? If so, of what nature?
4. Has any analysis of the water been made? If so, give it.

Any other statements regarding your water supply, its purity, etc., will be thankfully received.

Very respectfully,
W. H. DICKINSON,
Committee on Water Supply.

The replies were made direct to the Committee, and will be found in the report of the Committee. Incidentally, however, much information may be gathered on this subject from special correspondents in reply to circular 23B. It is hoped that information will be secured on this subject so as to make possible a satisfactory statement of the condition in any part of the State.

PLEURO-PNEUMONIA AMONG CATTLE.

Early in the month of March, 1881, rumors were rife that *pleuro-pneumonia* had made its appearance in various sections of the State. In Taylor county, and also in Clinton county, it was reported as seriously decimating cattle. In the absence of special statutes upon that subject, securing immunity or protection from that disease, I wrote the Attorney-general, asking his opinion thereon; to-wit,

IOWA STATE BOARD OF HEALTH,
SECRETARY'S OFFICE, March 14, 1881.

HON. SMITH MCPHERSON, *Attorney-general:*

MY DEAR SIR: Much alarm exists throughout the State regarding the probable presence of *pleuro-pneumonia* among cattle, introduced into the State by a large lot of calves brought from the East last fall, and distributed over the State. Large numbers of them have died, and the cause has been pronounced by some veterinary surgeons to be *pleuro-pneumonia*, a fatal, and terribly contagious disease. The effect of the disease upon the flesh of cattle used for food must largely increase the mortality list. In England, it is reported, the increase from eating the flesh of cattle thus diseased, has been, since 1842, when the disease appeared there, from 1 to 5.8. It appears to me that this disease comes within the powers of the State Board of Health to regulate and control, as one affecting "the lives and health of the people." Upon this question I would call your attention to the first clause of Sec. 2, Chap. 151, Laws of 1880, and request your opinion thereon.

In the absence of any special legislation upon the subject, if any protection to the people can be had to promptly stamp out this disease, if it exists, it must come through the powers granted in said Chap. 151. An early answer is solicited, as whatever is done, must be immediately.

Very truly,
L. F. ANDREWS, *Secretary.*

Owing to the demands of official business a reply was not made until April 9th. In the meantime, action had been taken in another direction, as will be seen hereafter. The following is the reply of the Attorney-general:

STATE OF IOWA,
OFFICE OF ATTORNEY-GENERAL,
RED OAK, April 9, 1881.

L. F. ANDREWS, *Secretary State Board of Health, Des Moines:*

DEAR SIR—Your letter of the 11th ult., asking whether, in my opinion, the Board could cause to be destroyed cattle affected with *pleuro-pneumonia* ought to have been answered earlier, but official business of great importance has prevented. As I learn, from newspaper reports, the importance of this matter is at least in a state of suspension, the rumors and belief that this disease existed in Clinton county being dispelled by a personal examination by Dr. Robertson, assisted by a veterinary surgeon of high standing.

That this disease is contagious, and most alarming and fearful in consequence, is no longer debatable. That the use of meats and milk from animals affected with this disease has largely increased the death rate in those sections where the disease has prevailed, is well and conclusively authenticated. In both England and Scotland the death rate has increased from 1 to 5.8 in 10,000 deaths since this disease was there introduced.

"Since the introduction of the disease into Great Britain, in 1842, the mortality from carbuncles has increased in England from 1 to 5.8, and that from phlegm from 2.5 to 8.1 in 10,000 deaths. A similar fact has been noticed with regard to Scotland, and in both cases the increased mortality has been ascribed to the fact that so much of the diseased meat had been eaten."

"Prof. Gamgee states that in a convict establishment, where such animal food was eaten, there occurred 40 or 50 carbuncles a month among 1,520 prisoners."

"Dr. Livingston asserts he has seen very serious illness caused by eating the flesh of cattle that had been so slightly sick with *pleuro-pneumonia* that the disease was hardly noticeable, and the flesh was apparently sound. In these cases the virus was not destroyed by thorough cooking.—*Sixth Annual Report, Massachusetts State Board of Health, 1870, p. 109.*

"In England the disease has more than doubled the ordinary mortality of this country."—*Dr. James Law Department of Agriculture, Washington, D. C., Special Report, No. 12, p. 243.*

"All meat, from whatever source it may come, that would cause sickness, disease or death in man, if partaken as food, must be regarded in the light of sanitary science as *diseased*, and consequently unfit for human use in any form. Hence a disease in which a contagious virus is developed during its course, or a virulent principle generated in the blood, renders the meat from all such animals thus affected exceedingly dangerous as an article of food. Tuberculous deposits upon the pleural membrane lining the chest cavity, thus causing the lungs to adhere to the ribs or along the internal walls of the abdomen, are sufficient evidence to condemn the carcass. It is conceded by pathologists that the bovine form of tuberculosis is identical with that of man."—*Noah Cressy, M. D., V. S., Ph. D., Hartford, Conn.*

"This disease in cattle is very infectious; the presence of a specific virus is evident; the flesh of such diseased animals, under certain circumstances, and also the milk, possesses infective properties."—*Prof. Gerlack, Berlin Veterinary School.*

"When we see thousands of tubercular deposits in a single slaughtered animal, we are forced to conclude that the use of such meat can in no way promote our healthfulness."—*Thomas Walley, Principal Edinburg Royal Veterinary College.*

"That tuberculosis of cattle can be conveyed not only to cattle but to other species of animals, is an established fact. There is, therefore, every reason to prohibit the use of milk from cows affected with tuberculosis, and especially for infants, whose powers of absorption are very active. The part this liquid has played in the production of *tabes mesentrica*, or tuberculosis, in the bowels, from which many children have died, has rarely been suspected."—*George Fleming, Veterinary Inspector to the British Army, and F. R. C. V. S.*

"The milk of such animals has a pre-eminently contagious influence. Such milk, even when boiled, still retains its injurious properties."—*Otto Bollinger, University of Munich.*

"This milk contains a specific virus that can be transmitted to man."—*Prof. Gerlach.*

"But twenty-five per cent of the cases of consumption in man are due to hereditary transmission. The other seventy-five per cent are caused by unsanitary influences. The origin of more or less of this large percentage is doubtless due to infection from meat or milk."—*C. W. Chamberlain, M. D., Hartford, Conn.*

That the presence of this disease, in some localities, is a matter of the highest concern to stock-raisers and the farmers generally from a financial standpoint, and to the country at large from a sanitary standpoint, cannot be questioned, after reading the authorities above quoted. I have cited these authorities for the purpose of calling attention to this subject that it may receive the attention which it now, or, in all probability, soon will, demand.

But, of course, this does not dispose of the question suggested by you. The powers of the board are those only conferred by the statute. Unless the powers are given by chapter 151, laws of 1880, they do not exist at all. In my opinion, the only claim for such authority is the first paragraph of section 2, of said act, which is:

"The State Board shall have the general supervision of the health and life of the citizens of the State."

I have no doubt but that under this section and other parts of the statute the power exists to prevent the use of meat supposed to be diseased; or, in case the disease reached the form of an epidemic, to prevent *in toto* the use of any beef, or milk from the cow. To my mind, that is clearly conferred. But the power to destroy the animals I do not believe is conferred. That would be a construction that is scarcely warranted. Tribunals of the character of the board cannot claim to exercise powers not clearly given.

Yours very truly,

SMITH MCPHERSON,
Attorney-general.

That the people were restive and uneasy, regarding the supposed presence of this disease is evidenced by the following correspondence and reports:

WHEATLAND, IOWA, March 11, 1881.

HON. J. H. GEAR, *Governor of Iowa, Des Moines:*

DEAR SIR—I have the honor to report to you (deeming it expedient from your published circular letters to the auditor of Scott county), that in the month of October, 1880, I purchased at Chicago fifty-seven head of calves, said to have come from Michigan, brought them here and put them with some I had raised from my own cows here, making together, eighty head. All seemed healthy together until the second day of this month, when some of them gave signs of disease. I called upon our veterinary surgeon here, who pronounced the disease *pleuro-pneumonia*, At this date ten head have died, and all of them show signs of the disease and the chances are that most of them will die; and if any live until the pasture season, will be liable to spread the disease, not only to the balance of my own herd, but also to my neighborhood and throughout the country. Can the State give any assistance in the matter.

Yours, etc.,

N. DAVISSON.

THE STATE OF IOWA,
EXECUTIVE DEPARTMENT,
DES MOINES, March 14, 1871.

DR. W. S. ROBERTSON, *Muscatine, Iowa*:

DEAR SIR—I am in receipt of a letter from Wheatland, Clinton county, a copy of which I enclose you.

On the receipt of this I wish you to go *at once* to Clinton, to confer with the county authorities of that county, to whom I have written.

Should the facts set forth in the letter be found to be true, I think there is ample authority under chapter 151, acts of the Eighteenth General Assembly, to empower the Board, of which you are president, to act. If the *pleuro-pneumonia* is really found to exist, take prompt measures to *stamp it out*. The county authorities should promptly co-operate with you in this matter, and I think the next General Assembly will, beyond question, make an appropriation to meet any loss occasioned in eradicating this dread disease. I need not say to you how great the loss to Iowa would be if this scourge should spread among the cattle of the State. It could only be computed by millions.

I would suggest that you give no publicity to this matter until you examine into it fully. Yours truly,

JNO. H. GEAR.

REPORT OF DR. ROBERTSON.

STATE BOARD OF HEALTH,
OFFICE OF THE PRESIDENT,
MUSCATINE, IOWA, March 19, 1881.

HON. JNO. H. GEAR, *Governor of Iowa:*

DEAR SIR—In compliance with your order of the 14th inst., I went to Wheatland, Clinton county, Iowa, to investigate the condition of the herd of calves of Mr. N. Davisson, said to have *pleuro-pneumonia*.

I found the sanitary condition of the herd bad—almost in the extreme. They have probably been fed enough, but not in such away as to do the greatest amount of good. I find their stables unventilated and foul from excrementitious deposit; for instance, I was told that *thirty-five* head of calves (coming yearling) slept in a place in the barn about twelve feet wide and thirty feet long and eight or nine feet high; a shed standing with the end to the barn (two openings into it) about the same size, closed on one side and end and open to the east with the eaves high enough to allow a calf to walk under it, furnished sleeping room for another lot and a shelter through the day. Another lot slept in the basement of the barn, which the sons reported "as too dirty to go into." I saw the herd about 8 o'clock A. M.; the calves were eating hay in an open lot near this open shed, and their hair was yet damp from the condensation of their breath in the unventilated sleeping apartment. Hay was fed from the ground without racks or boxes, and was trampled under foot by the constantly shifting herd as they push each other about. The skeletons (carcasses half consumed of dead calves) lay among the living, no means having been taken to destroy or dispose of any dead animals, except as they were eaten by the hogs occupying the same lot. Dr. Cook, of Wheatland, having seen the lungs of some of the calves which died a few days before my visit, and Dr. Bulenberg, the veterinary who had sometimes prescribed for, and pronounced the disease *pleuro-pneumonia*, were requested to accompany me, and assist in an examination which I proposed to make, that I might have their opinions as to the comparative condition of the lungs of the animal killed, and those which died of the disease in question. Mr. Davisson promptly consented to the proposed examination, his sons selecting several calves which they believed to be coming down with the disease that had affected those which had died; from this selection we chose a calf suppose to have the typical symptoms and killed it. While I have never seen a case of *pleuro-pneumonia* in cattle, I am glad to be able to say that I did not find the pathological condition of the lungs and pleural surfaces, which we find in that disease in the human subject, but did find quite extensive *tuberculization* of the lungs, with one or two small circumscribed abscesses. The pleura covering the lungs, the chest wall and the diaphragm, was healthy. The heart, the liver, the spleen and the kidneys were normal.

The veterinary surgeon in his report stated that the lungs were dark, soft and offensive, *hence* he called the disease "*pleuro-pneumonia.*" I need hardly say, that this condition may be recognized as *gangrene* of the lungs and is not of necessity—*or at all*—pleuro-pneumonia. These calves belong to that class known as "skim-milk, or buttermilk calves"—in other words, animals which from being weaned at an early age, subsequently poorly fed upon slops and skimmed milk, in short, insufficient food, suffer a lack of constitutional vigor, and while thus enfeebled, received a second shock by a railway transportation from Michigan to Chicago; and before they had either time or opportunity for recuperation, are again shipped by rail and brought to Iowa. Under such conditions it must require considerable time and special care to get them into good condition—if such be possible—to enter upon and endure the rigors of such a winter as the last has been. If added to all these conditions are conjoined the very unsanitary surroundings of this herd we can scarcely be surprised that they should suffer from such diseases as accompany a low vitality and depressing influences.

The question of contagion and infection is an important one and while this whole subject may be said even yet to be "*sub judice,*" Law, in his "Report on Diseases of Domestic Animals," in the *National Health Bulletin*, July 24, 1880, (Library of State Board of Health) believes "tuberculosis" in cattle to be contagious. I am inclined to the opinion that Mr. D. will lose his whole herd of calves, and there is (if we may credit the theory of Law) danger that other cattle occupying the same pasture may contract the disease, and we may reasonably expect the weak and young to show the greatest susceptibility. At this time there seems to be a period of quietude, if you please, of the disease, but the disease is there—tuberculosis—and it will—sooner or later—and at no very distant day declare itself by recurring deaths. I would recommend that when the calves again begin to die daily—none having died for a week now—that a *competent veterinary* surgeon be sent there to further investigate the disease before the cattle are turned upon pasture. The board of supervisors not being in session, I did not think it necessary for me to visit Clinton and confer with the county auditor, but wrote him my impressions of the case and solicited correspondence.

Having no executive authority under chapter 151 of Eighteenth General Assembly, I simply ventured some suggestions in the premises. My only apology for the length of the report must be found in the importance of the subject. I have the honor to be, my dear sir,

Very truly yours,

W. S. Robertson,
President State Board of Health.

REPORT OF DR. DETMERS.

Hon. J. H. Gear, *Governor of Iowa:*

Sir—Your favor of the 26th ult., in which you request me to go to Wheatland, Clinton county, Iowa, and to examine there a herd of calves or yearlings alleged to be affected with *pleuro-pneumonia.* arrived in due time, but owing to my absence from home, I did not receive it till Wednesday, the 30th ult. I immediately wrote to the Hon. President of the Iowa State Board of Health, W. S. Robertson, M. D., at Muscatine, Iowa, from whom I also found a letter on my table, in which he asked me to meet him at Wheatland at such a day as would be convenient to me. On Tuesday, March 31st, I went to Wheatland in compliance with your request, and arrived there in the evening of the same day. I expected to meet Dr. Robertson, but owing to snow-storms, inundations, and high water everywhere, no train arrived at that place from Davenport, and Dr. Robertson, after much delay, was obliged to come over *via* Fulton. He, therefore, did not reach Wheatland before Friday evening, too late to go to Mr. Davisson's place, and to proceed with the examination. We, Dr. Robertson and myself, went there early next Saturday morning, and after looking over the grounds, made a thorough examination of nearly all those calves and yearlings which exhibited any symptoms or indications of disease. But before I proceed further, allow me to make the following statements: Mr. Davisson bought in October fifty-seven calves in Chicago—said calves were bought in the "Northwestern" division of the stockyards, and represented as having come from Michigan, and as he raised nine calves himself, his herd of calves, after the purchase of the fifty-seven, consisted of sixty-six animals. Of these he lost by death in all eighteen head, most of which died in November, December and January. Dr. Robertson counted forty-three head in the yard, but I afterward found three calves in the barn, of which I do not know whether the same were in the lot when the herd was counted or not. Mr. Davisson's statement as to his losses may, therefore, be approximately correct. We, Dr. Robertson and myself, subjected seven calves to a special examination. They all, and several others too, coughed, were lousy and emaciated, exhibited indications of being unthrifty and not in good health, *but none of them presented any symptoms characteristic of contagious pleuro-pneumonia of cattle or bovine lung plague.*

Their temperature, ascertained by a thermometer which I know to be correct and reliable, proved to be as follows: Calf No. 1, 101.5° F.; No. 2, 102° F.; No. 3, 100.5° F.; No. 4, 103° F.; No. 5, 100.8° F.; No. 6, 100.4° F.; and No. 7, 101.5° F. Consequently only one animal—calf No. 4—presented an abnormally high temperature; viz., 103° F. Therefore, in order to remove every doubt, it was concluded to kill calf No. 4 for *post-mortem* examination. The same was killed by bleeding, and the autopsy was immediately made by myself. On opening the chest both lungs appeared to be perfectly collapsed, and of hardly more than normal size and weight. As was afterward ascertained, every portion of them, when thrown into a bucket full of water, not only floated, but also remained with more than half of its substance above the surface of the water; consequently there was nowhere any serious condensation or hepatization, such as is always found in contagious *pleuro-pneumonia.* The thoracic cavity contained a small quantity of serum, but the pleuras (costal and pulmonary), and also the pericardium, presented everywhere a smooth surface and a perfectly normal appearance. On cutting into the lungs several lobules in both lungs, but particularly such as are situated in close proximity to larger bronchi, appeared to be somewhat infiltrated with yet fluid exudation, but the latter existed only in the lobules proper, and NOT *at all in the inter-lobular connective tissue,* while *in contagious pleuro-pneumonia the inter-lobular connective tissue invariably becomes filled with plastic exudation before the lobules themselves are seriously affected.* The bronchi and bronchial tubes, or at least many of them, were opened for the purpose of ascertaining the presence or absence of worms (*Strongilus micurus*), but none could be found.

In conclusion I have to say that *the calves or yearlings in question are not and never have been affected with contagious pleuro-pneumonia or bovine lung plague.* That so many of the calves purchased by Mr. Davisson have died, and that so many of those yet living are more or less diseased, can be accounted for to a great extent: *First,* by the calves being not acclimated when taken to Mr. Davisson's farm, and thus, at a tender age, subjected to very severe changes, not only as to food, but also as to keeping and treatment in general; *Second,* by the very bad sanitary conditions prevailing on Mr. Davisson's premises.

People who import Eastern calves, and compel the same to accommodate themselves at once to Western food, climate, and mode of keeping, must not complain if their losses are heavy.

Very respectfully submitted,
H. J. DETMERS.

CHICAGO, ILL., *March 4, 1881.*

SUPPLEMENTAL REPORT OF DR. ROBERTSON.

State Board of Health,
OFFICE OF THE PRESIDENT,
Muscatine, Iowa, April 4, 1881.

Hon. Jno. H. Gear, *Governor of Iowa:*

Dear Sir—I have the honor to report that, according to appointment, I met H. J. Detmers, V. S., of Chicago, at Wheatland, Clinton county, Iowa, on last Saturday, and we examined the herd of calves belonging to Mr. N. Davisson, which had been reported to your office as having *pleuro-pneumonia.* While Dr. Detmers will furnish your office the formal report of our investigation, I may say that it confirms my former report, that the disease "is not epidemic pleuro-pneumonia, and is not believed to be contagious." An improved sanitation since my former visit has improved the general condition of the stock, but, as already remarked, the vitality of the herd is extremely low, and the rigors of severe winter have induced in them a degree of suffering and loss which animals of greater constitutional strength would not have experienced.

Mr. D. feels the loss of the animals deeply, and I respectfully suggest that the State recompense him for the loss sustained in the animals killed for examination by myself and Dr. Detmers, which was for the protection of the herds of Iowa from so dread a calamity as epidemic *pleuro-pneumonia.*

I am, my dear sir, very truly yours,
W. S. Robertson,
President State Board of Health.

At the regular meeting of the State Board, May 3, 1881, Dr. Robertson, President of the Board, presented the foregoing correspondence and reports, which were accepted, and the Secretary was instructed to have printed one thousand copies thereof, to be distributed to the secretaries of agricultural societies in the State, which was accordingly done.

Public alarm immediately subsided, and what promised to be a serious disturbance of the traffic in cattle from this State was averted by the prompt measures taken to decide the nature of the disease; for, so soon as the rumored presence of the disease became current, application was made to this office, by the British Consul resident in Chicago, for all facts attainable in relation thereto, thus showing how closely England watches her sources of food supply.

REPORTS BY HEALTH PHYSICIANS AND CLERKS OF LOCAL BOARDS OF HEALTH.

For the year 1880, the clerks of three hundred and eighty-eight townships and twenty-nine cities and towns, and one hundred and seventeen health physicians, made a report to this office. There are one thousand five hundred and twenty-eight townships and two hundred and eighty-three incorporated cities and towns (as recorded with the Secretary of State) in the State, so that reports were received from less than one-third of the State.

The information sought from the clerks and health physicians of local boards of health, if fully rendered, would furnish the data from which to construct a complete map of the condition of every locality in the State, so that by study and comparison may be ascertained the conditions under which "diseases dangerous to the public health" prove most fatal, and the most suitable methods for their prevention.

It was not expected that perfection would be reached by this first effort. The vast majority of the people have never given the matter a thought. The subject is entirely new, and many had no knowledge or conception of what was required. Instead of using the blanks prepared by this office for their report, seventy-five clerks write a a special letter saying they have no report to make, because there has been no sickness and no contagious diseases. They do not appreciate the fact that it is equally important, in compiling a record of the State at large, to know where there has been little or no sickness as to know where there has been little or much, that the causes may be studied and made known. A few samples of these letters are hereto appended:

COLLEGE TOWNSHIP, LINN COUNTY, November 11, 1881.

Secretary State Board of Health:

The only cases of disease dangerous to the public health are two cases of scarlet fever, neither fatal.
JOHN M. WILSON,
Clerk.

CLEAR CREEK TOWNSHIP, JASPER COUNTY, November 6, 1880.

I did not receive a copy of the laws of the Eighteenth General Assembly until too late to call a meeting of the trustees on the first Monday in November, so we have no board, and I have no data from which to make a report. Will state from unofficial sources that we, as a rule, are enjoying the ordinary blessings of health. Diphtheria is in the township, but no fatal cases that I know of.

CASS STOCK, *Clerk.*

RUSSELL, LUCAS COUNTY, November 15, 1880.

Secretary State Board of Health:

The trustees of Washington township organized as a board of health last July and appointed a health physician, but transacted no further business. Neither of us has sufficient data with which to fill the blank reports. The subject of health would be an important one in this locality if properly reported. Within the last year there have been many cases of scarlet fever of serious type; also of diphtheria. Not being able to report on the blank, I send this.

ALFRED GOODWIN, *Clerk.*

RICHLAND TOWNSHIP, CHEROKEE COUNTY, November 15, 1880.

Secretary State Board of Health:

DEAR SIR—The local board met but did nothing, as they thought there was nothing to do. There have been no contagious diseases in the township, and there is no physician therein.

F. D. BAILEY, *Clerk.*

MURRAY, CLARKE COUNTY, November 8, 1880.

Secretary State Board of Health:

DEAR SIR—No epidemic or contagious diseases in this township. Have nothing to report.

S. L. LANDIS, M. D.,
Health Officer.

ELLINGTON, HANCOCK COUNTY, November 4, 1880.

Secretary State Board of Health:

DEAR SIR—This is a very healthy country up here. There have been but three or four deaths and no dangerous diseases in this township during the past year.

CHARLES A. CLARK, *Clerk.*

SERGEANT'S BLUFF, WOODBURY COUNTY, November 8, 1880.

Secretary State Board of Health:

DEAR SIR—I do not exactly understand what kind of report should come from me. We have had no contagious diseases in this township during the past year.

J. A. TAFT, *Clerk.*

WASHINGTON, BUENA VISTA COUNTY, November 8, 1880.

Secretary State Board of Health:

DEAR SIR—I am at a loss to know what is my duty. The trustees have taken no action, and no health physician has been appointed. The health of the township is good; no contagious diseases—in fact, no sickness of any description. I will cheerfully perform any duty when I know what is required.

THOMAS J. MCCLUNG, *Clerk.*

MIDDLEFIELD, BUCHANAN COUNTY, November 6, 1880.

Secretary State Board of Health:

DEAR SIR—Our trustees have not organized. I am not posted on the duties suggested in your circular. Diphtheria has raged in this township; know of but one death.

A. M. LANE, *Clerk.*

LINCOLN TOWNSHIP, POWESHIEK COUNTY, November 1, 1880.

Secretary State Board of Health:

DEAR SIR—We are all ignorant as to our duty under this law. There has been nothing contagious in this township, except a few cases of diphtheria; one death. J. C. MORGAN, *Clerk.*

WASHINGTON, POLK COUNTY, November 16, 1880.

Secretary State Board of Health:

DEAR SIR—The trustees have not yet organized as a board of health. Not having received acts of the General Assembly, they did not know their duty. They supposed the law applied only to cities and towns. We will endeavor to work in harmony with the State Board. There have been several cases of diphtheria in this township, but none fatal. ASAPH A. KNOWLTON, *Clerk.*

STANTON TOWNSHIP, PLYMOUTH COUNTY, November 12, 1880.

Secretary State Board of Health:

DEAR SIR—We have had no disease of any kind in our township, therefore the board did not organize. It is a high, cool country, and exceedingly healthy.

THOMAS STOKES, *Clerk.*

WINDSOR TOWNSHIP, FAYETTE COUNTY, November 12, 1880.

Secretary State Board of Health:

DEAR SIR—The health of our township is good, with no epidemics to report. Most of the deaths have been of children, from diphtheria, four in all.

JAMES GROHORN, *Clerk.*

HIGHLAND TOWNSHIP, GUTHRIE COUNTY, November 26, 1880.

Secretary State Board of Health:

DEAR SIR—After receiving your blanks and circulars, I notified the township trustees, and requested them to take some action, but they ignored the whole matter, and said they would have nothing to do with it, that we had no physician in the township, and did not need any. We had no contagious diseases.

D. G. GARNES, *Clerk.*

MUSCATINE, August 7, 1880.

Secretary State Board of Health:

DEAR SIR—In the latter part of May a mild epidemic of scarlet fever appeared at this place. The epidemic lasted until about June 15th, and resulted in twenty (20) cases and five deaths. At the above date the epidemic ceased. However, on August 1, one case was reported, and since that time the number has been increased to eight, with one death, making in all, since June 1, twenty-eight (28) cases and six (6) deaths.

Yours, etc.,
F. H. LITTLE, *Health officer of Muscatine.*

Under date of October 4th, Dr. Little wrote:

It again becomes my duty to report another outbreak of scarlet fever, which occurred in this city about September 20th. Nine cases were reported and one death. We have had no cases of the disease since August 1st, when it suddenly appeared. The first case was of malignant form, the patient dying at the end of the third day of the attack. The other cases have been of the simple form of the disease, and no deaths.

We have isolated the cases as much as possible, and I am happy to say the threatened epidemic is abating.

Yours, etc.,

F. H. LITTLE, *H. O.*

WAUBEEK, LINN COUNTY, July 16, 1881.

Secretary State Board of Health:

DEAR SIR—I am informed you have adopted rules and regulations in regard to contagious diseases, and have them printed in form for posting. Will you please send a few; also copies of your circular on diphtheria. We are severely afflicted in this locality at present with a very malignant type of diphtheria which can only be checked by rigid quarantine.

Yours truly,

E. A. WARNER.

WAUBEEK, LINN COUNTY, August 14, 1880.

Secretary State Board of Health:

DEAR SIR—Our board of health is at last organized for protection, but diphtheria is raging fatally, and is spreading through the county. Please favor us with any thing you can for our benefit. Send a dozen or more of your circulars on diphtheria, and oblige yours,

D. W. KING.

WAUBEEK, LINN COUNTY, July 22, 1880.

Secretary State Board of Health:

DEAR SIR—I will give you some facts in regard to our recent epidemic of diptheria. The disease has visited us in a very severe form, out of forty cases only three or four being anything like light. Several cases, after recovery from the severity of the disease, have resulted in death from exhaustion, owing to the profoundly altered state of the blood. There has been a total of forty cases, with twelve deaths. I have had the management of them all. Some advanced rapidly to a fatal termination; others lingered three or four weeks. Some of them were of the most malignant type, bleeding from nose, eyes, ears and mouth, and at all points on the body where there was an abrasion of the skin. Three died from diptheritic croup. At first people did not heed my warning to be cautious about its spread, but finally they became almost panic stricken, and are now ready for any suggestions, with the exception of a few, who still will not believe in the great contagiousness of the dread disease. The epidemic is now declining. I only have four cases, all in one family, and recovering. One of them is suffering from paralysis of the naso-palatine muscles, and a feeble and irregular heart. We desire information and suggestions from the State Board, and will endeavor to carry them out faithfully. This is the third time in two years the disease has visited this locality, but not in so severe a form.

Respectfully yours,

WARD WOODBRIDGE, M. D.,

Health Physician.

STATEMENT.

Showing by counties, the number of cities, incorporated towns, and townships in the State; the number of each from which reports have been received; the number of clerks and health physicians of local boards of health who have reported, and the number of cases of contagious diseases prevailing within the jurisdiction of such local board, for the yeer 1880.

COUNTIES.	CITIES.		TOWNS.		TOWNSHIPS.		Total No. clerks that have reported.	Number of health physicians.	CASES OF DISEASES.							
	Total number of	No. clerks that have reported.	Number of	No. clerks that have reported.	Number of	No. clerks that have reported.			Small-pox.	Cholera.	Diphtheria.	Scarlet fever.	Typhoid fever.	Measles.	Whooping-cough.	Cerebro spinal meningitis.
Total—State	47	8	318	21	1448	385	402	116	..	3	1474	714	356	841	487	27
Adair	..	....	2	....	17	2	2	....	..	..	....	...	..	...	...	....
Adams	..	....	2	...	12	2	2	....	..	..	....	...	...	6	...	....
Allamakee	..	....	2	....	18	5	5	....	..	..	....	...	1	1	...	....
Appanoose	1	...	2	....	17	4	4	....	..	..	3	...	1	...	2	....
Audubon	..	...	2	....	12	2	2	....	..	..	8	...	...	136	...	....
Benton	1	....	3	1	22	9	10	1	..	..	14	...	6	...	6	....
Black Hawk	2	1	1	1	18	7	9	6	..	..	18	7	13	...	...	2
Boone	1	....	3	1	17	4	5	1	..	..	1	...	...	...	...	....
Bremer	1	....	...	1	14	3	4	....	..	..	....	...	...	...	...	....
Buchanan	1	1	1	1	16	3	5	4	..	..	31	11	...	...	...	1
Buena Vista	..	....	3	....	17	1	1	....	..	..	....	...	...	...	1	....
Butler	..	....	4	....	16	6	1	2	..	..	11	1	1	...	...	....
Calhoun	..	....	2	....	15	5	5	1	..	..	2	...	5	6	19	....
Carroll	..	....	2	....	16	4	4	....	..	..	44	...	...	...	...	....
Cass	1	....	3	....	16	3	3	....	..	..	5	...	...	...	...	....
Cedar	..	....	6	....	17	5	5	10	..	..	140	34	33	25	8	3
Cerro Gordo	1	....	1	....	16	7	7	2	..	..	2	42	3	...	1	1
Cherokee	..	....	2	...	16	....	....	....	..	..	....	...	...	...	...	....
Chickasaw	..	....	3	....	12	2	2	1	.	2	6	6	3	...	25	....
Clarke	..	....	2	....	12	2	2	2	..	..	2	...	1	...	...	....
Clay	..	...	1	....	11	2	2	....	..	..	....	...	...	...	26	....
Clayton	..	....	4	....	22	11	11	6	..	1	92	1	...	7	4	....
Clinton	2	1	5	....	21	1	1	1	..	..	75	...	...	...	2	3
Cralwford	..	....	3	....	20	10	10	1	..	..	3	...	9	...	...	....
Dalas	..	....	6	....	16	4	4	....	..	..	1	...	...	24	...	....
Davis	..	....	2	2	15	5	7	2	..	..	49	18	7	62	36	....
Decatur	..	....	4	2	17	2	4	2	..	..	....	45	...	...	...	....
Delaware	1	....	1	....	16	13	13	1	..	..	31	9	1	...	...	....
Des Moines	1	1	1	....	11	2	3	2	..	..	59	43	16	...	2	....
Dickinson	..	....	1	....	12	6	6	....	..	..	15	...	2	...	2	...
Dubuque	1	....	12	....	18	3	3	1	..	..	1	3	5	...	...	1

STATEMENT—Continued.

COUNTIES.	CITIES.		TOWNS.		TOWNSHIPS.		Total No. clerks that have reported.	Number of health physicians	CASES OF DISEASES.							
	Total number of.	No. clerks that have reported.	Number of.	No. clerks that have reported.	Number of.	No. clerks that have reported.			Small-pox.	Cholera.	Diphtheria.	Scarlet fever.	Typhoid fever.	Measles.	Whooping cough.	Cerebro-spinal meningitis.
Emmet	..	....	....	....	9	3	3	....	..	..	....	...	...	...	...	....
Fayette	..	....	3	....	21	2	2	2	..	..	60	12	1	...	4	....
Floyd	1	....	3	....	12	4	4	....	..	..	....	2	...	2	...	....
Franklin	.	....	2	2	17	5	7	2	..	..	3	...	...	22	...	....
Fremont	1	....	4	1	13	5	6	2	..	..	13	...	19	22	11	....
Greene	..	....	3	....	16	3	3	....	..	..	....	25	1	39	8	....
Grundy	..	....	2	....	14	3	3	....	..	..	33	...	8	...	...	....
Guthrie	..	....	4	2	16	7	9	2	..	..	64	...	14	...	...	1
Hamilton	..	....	1	....	14	2	2	....	..	..	12	...	2	...	...	....
Hancock	..	....	....	....	14	2	2	....	..	..	11	6	...	...	...	....
Hardin	..	....	6	2	15	....	2	....	..	..	42	...	1	...	...	1
Harrison	..	....	4	2	20	9	11	2	..	..	40	18	6	2	7	....
Henry	1	....	3	....	12	6	6	3	..	..	....	...	6	40	...	....
Howard	..	....	2	....	11	2	2	1	..	..	....	...	3	...	1	1
Humboldt	..	....	3	....	12	....	....	....	..	..	....	...	...	...	...	....
Ida	..	....	2	....	11	....	....	....	..	..	....	...	...	...	...	....
Iowa	..	....	3	....	18	2	2	2	..	..	....	...	...	...	...	....
Jackson	1	....	4	....	18	3	3	3	..	..	....	1	1	10	...	....
Jasper	1	....	4	...	19	2	2	2	..	..	49	...	...	9	...	....
Jefferson	1	....	1	....	12	7	7	3	..	..	42	26	13	4	...	4
Johnson	1	....	2	....	20	4	4	....	..	..	27	...	6	...	2	....
Jones	1	....	4	....	16	1	1	1	..	..	7	...	...	...	...	....
Keokuk	..	....	6	....	16	5	5	6	..	..	94	63	19	171	68	4
Kossuth	..	....	1	....	9	3	3	1	..	..	13	...	...	...	6	....
Lee	2	1	3	1	16	....	2	....	..	..	....	...	1	33	...	1
Linn	1	....	5	....	20	4	4	4	..	..	....	...	...	...	...	....
Louisa	..	....	7	....	12	2	2	....	..	..	2	...	3	...	...	....
Lucas	1	....	....	....	13	5	5	....	..	..	4	22	1	...	...	....
Lyon	..	....	....	....	12	....	....	....	..	..	..	...	...	...	...	....
Madison	1	....	3	....	17	2	2	2	..	..	....	...	2	...	...	....
Mahaska	1	....	3	....	9	3	3	....	..	..	10	...	3	...	...	....
Marion	2	....	2	....	15	8	8	....	..	..	4	...	30	...	...	1
Marshall	1	....	4	....	18	6	6	2	..	..	2	12	...	12	41	....
Mills	..	....	4	....	14	....	....	....	..	..	....	...	...	...	...	....
Mitchell	1	....	4	....	15	7	7	1	..	..	2	32	2	...	...	....
Monona	..	....	2	....	19	8	8	2	..	..	32	6	2	18	...	....
Monroe	1	....	....	....	12	6	6	....	..	..	13	...	5	27	48	8
Montgomery	1	....	1	....	12	2	2	....	..	..	....	...	...	2	...	....
Muscatine	1	....	4	....	14	4	4	4	..	..	33	45	1	17	...	....
O'Brien	..	....	2	....	16	7	7	....	..	..	16	3	4	...	...	....
Osceola	..	....	1	....	9	5	5	....	..	..	....	...	4	...	...	1
Page	1	....	3	....	16	3	3	2	..	..	8	2	5	20	...	....
Palo Alto	..	....	1	....	14	9	9	....	..	..	....	...	5	...	5	....
Plymouth	..	....	2	....	20	5	5	....	..	..	4	...	1	...	3	...
Pocahontas	..	....	....	....	14	2	2	....	..	..	1	6	2	...	...	....
Polk	1	....	7	....	22	4	4	1	..	..	17	...	...	...	...	....
Pottawattamie	1	....	3	....	27	5	5	....	..	..	8	...	...	55	...	....
Poweshiek	1	....	4	....	15	4	4	4	..	..	12	...	...	...	...	....
Ringgold	..	....	1	1	17	3	4	....	..	..	....	...	...	...	...	2
Sac	..	....	3	....	16	3	3	....	..	..	....	...	...	...	...	....

STATEMENT—CONTINUED.

COUNTIES.	CITIES.		TOWNS.		TOWNSHIPS.		Total No. clerks that have reported.	Number of health physicians	CASES OF DISEASES.							
	Total number of.	No. clerks that have reported.	Number of.	No. clerks that have reported.	Number of.	No. clerks that have reported.			Small-pox.	Cholera.	Diphtheria.	Scarlet fever.	Typhoid fever.	Measles.	Whooping cough.	Cerebro-spinal meningitis.
Scott	1	....	3	....	16	10	10	4	.	..	39	85	27	10	37	....
Shelby	..	....	2	1	16	7	8	2	..	..	2	11	3	8	...	....
Sioux	..	....	...	...	14	....	....	....	..	..	....	...	...	...	...	....
Story	..	....	3	....	16	8	8	3	..	..	37	11	10	21	1	....
Tama	..	....	5	....	21	6	6	3	..	..	16	49	3	14	22	....
Taylor	..	....	3	....	17	7	7	....	..	..	13	...	3	1	...	....
Union	1	....	1	....	13	1	1	....	..	..	....	...	4	...	...	....
Van Buren	..	....	5	....	14	2	2	....	..	..	....	...	12	...	...	....
Wapello	1	....	3	....	14	4	4	2	..	..	17	19	...	98	72	....
Warren	1	....	2	....	16	....	....	....	..	..	....	...	...	...	...	....
Washington	1	....	1	....	15	3	3	1	..	..	....	2	3	...	...	....
Wayne	..	....	4	....	21	2	2	....	..	..	17	...	6	...	...	....
Webster	1	....	1	....	23	5	5	1	..	..	51	14	10	12	19	2
Winnebago	..	....	2	....	5	1	1	....	..	..	....	...	...	...	...	....
Winnesheik	1	....	3	1	20	1	2	1	..	..	7	12	...	...	...	....
Woodbury	1	....	...	....	23	2	2	....	..	..	9	...	1	...	...	....
Worth	..	....	1	....	12	2	2	....	..	..	1	7	...	...	...	....
Wright	..	....	1	....	15	3	3	....	..	..	....	...	...	...	...	....

The foregoing statement is compiled, not because of the value it contains, but for the purpose of showing those whose duty it is to furnish the reports from which the statement is compiled, the methods, and the importance of greater completeness and care. In many cases it is impossible to tabulate the reports. Instead of giving figures to designate the cases of diseases, entries would be made of "several"; "a few"; "unknown"; "some"; "none reported"; "several, but not reported to me." The very meager reports from health physicians evidences that very few local boards were organized throughout the State. It will be seen that only eight clerks of cities, twenty-one clerks of incorporated towns, and 388 clerks of townships, have reported. The only value of statistical reports rests in their completeness. It is hoped there will be a more perfect compliance with the law. The names of every city, town, and township clerk in the State are on record in this office, but it has been deemed best not to give the statement of townships, cities, and towns in this report, believing that as the local officers and the people become familiar with the law and its object, there will be a more general compliance with its provisions.

STATEMENT

Showing the information received from the clerks and health physicians of the county of Scott for the year 1880.

CITY, TOWN OR TOWNSHIP.	Towns.	NAME OF CLERK.	POST-OFFICE.	Number of health physicians.	NAME OF HEALTH PHYSICIAN.	POST-OFFICE.	CASES OF DISEASE.						
							Small-pox.	Diptheria.	Scarlet fever.	Measles.	Whooping cough.	Typhoid fever.	Cerebro-spinal meningitis.
Allen's Grove		W. P. Reed	Dixon	1	S. R. Cook	Dixon		4	5		3		
Buffalo													
Buffalo	1												
Butler													
Blue Grass				1	B. T. Gadd	Blue Grass		2	4			2	
City of Davenport													
Cleona		E. P. Pepoon											
Davenport		John S. Ackley	Davenport						a few				
Davenport (city)		John McSteen	Davenport	1	A. W. Cantrill	Davenport		26	78		2	2	
Hickory Grove													
Le Claire		John J. Elliott	Le Claire		None	None			6				
Le Claire	1												
Liberty				1	S. R. Cook	Dixon		1	7		1		
Lincoln													
Pleasant Valley													
Princeton		J. B. Parcell	Princeton	1	John Knox	Princeton			7				
Princeton	1			1	John Knox	Princeton			27		20		
Rockingham		R. S. Whyte	Rockingham		None	None			7		4	6	
Sheridan		E. V. Van Eps	Eldridge		None	None		2					
Winfield		Chris. Marty	Long Grove		None	None					1		
	3			6			....	35	139	....	31	10	....

The foregoing statement is printed, that clerks and health physicians of local boards of health may see the object of securing these reports. If there were complete returns from each locality in the State, the information contained therein would be valuable, in connection with vital statistics gathered from other sources. Whenever accurate reports can be had of contagious diseases, the months of their prevalence throughout the year, and their causes, the compilation will be extended. It was not expected to secure these results the first year, but there is no reason why great improvement should not be made, as those public officers having duties to perform become familiar with the law, and understand the importance attached to the information which they can contribute to aid in securing methods for the prevention of contagious diseases.

Very many health physicians omit in their reports important facts. They give the number of cases of contagious diseases, but omit the months in which they prevailed, and also their sources. Some report "several" cases; some "a few"; some give the number of cases, but omit to state the kind of disease.

If the reports received from clerks and health physicians is an indication, there are but comparatively few organized local boards of health. In fact a large proportion of the township clerks report that the trustees have neglected entirely to take any action under the law. There are fourteen hundred and forty-eight townships in the State; only four hundred and two clerks have made any report, of whom more than one-half state that there is no organized board of health in the township. Inasmuch as there exists, by virtue of law, a board of health in every city, town and township within the State, the dereliction of duty, is as unfortunate as reprehensible. In several counties exist active and model boards of health, and the result of their labor is seen in the large decrease of mortality rate, and exemption from epidemic diseases. One of these boards reports they have reduced the mortality nearly one half, and that it is two thirds less than the three surrounding townships where no organized board exists; beside they have been able to control and restrict contagious diseases, of one of which (diphtheria), they were menaced in a marked degree. A vast amount of useful knowledge might be obtained for the information of all, if local officers would collate and send to this office, the result of their experience. It is firmly believed that so soon as a more thorough organization exists throughout the State, abundant material will be furnished, from which to compile statements beneficial to the public, and tend to greater zeal in sanitary matters.

PREVALENCE OF DIPHTHERIA BY MONTHS.

From the returns made by the officers of local boards, the following table of prevalence of diphtheria by months of the year is compiled:

January	54	July	36
February	29	August	107
March	22	September	129
April	31	October	352
May	24	November	86
June	19	December	30

The clerk of Sharon township, Clayton county, reports fifty-three cases of diphtheria in that township, the first appearing May 28, the last October 26.

While the following returns embrace but a very few of the towns and townships of the State, and are not even an approximate representation of the actual facts they show so far as they go, that diphtheria is a cold weather disease. The statement is here given not so much to settle a question of time as to show the officers of local boards, whose duty it is to report these facts, the importance of full and complete returns.

SMALL-POX.

Sporadic cases of small-pox were reported to this office during the winter and spring of 1880-1, from Creston, Union county, Prescott, Adams county, and Lenox, Taylor county. In all these cases the source was traced to Burlington. Cases were also reported from Calliope, Sioux county, where the disease assumed nearly an epidemic. The source was traced to Dakota. From these cases the disease was carried to Jefferson, Greene county; thence to Dayton, in Boone county. Cases were also reported from Carlisle, brought there by a family who came from Illinois. From the same source, a case was developed in Des Moines. In all the foregoing, prompt isolation and vigorous quarantine measures confined the disease, except in Calliope, to the original case. The local papers at Burlington reported several deaths from this disease, but no authoritative report of the same has been received at this office.

The practical experience in these cases has demonstrated beyond dispute or doubt that, with a well-organized board of health in any locality. this dreaded disease may be entirely controlled and rendered comparatively harmless.

During the year, there was repeated inquiry as to the powers of local boards relative to small-pox, and whether or not such boards had power to require general vaccination of the people within their jurisdiction. The matter was referred to the Attorney-general, who returned the following opinion :

> Section 22, chapter 151, laws 1880, provides for the removal of person infected with small-pox; also for other persons in the neighborhood, and declares that the local board "*may take such other measures as may be deemed necessary for the safety of the inhabitants.*" I have no question at all, but that local boards of health have the power to regulate and determine how vaccination shall be done; and that the board may direct all persons shall be vaccinated.

ABSTRACT OF PROCEEDINGS OF THE MAY MEETING, 1881.

The Board met at the office of the secretary, May 3, 1881. There were present all members of the Board, except Dr. Roberts.

The President submitted a series of resolutions adopted by the Scott County Medical Society, indorsing the object and purpose of the State Board of Health, together with his reply thereto, which were accepted and placed on file.

The President presented a series of suggestions relative to necessary legislation to secure a more satisfactory operation of the health law, which were referred to the Attorney-general.

Mr. Loring, civil engineer, presented a question of drainage, and the right of carrying water by drains across the lands of another, and the necessity for legislation thereon, which was referred to the Attorney-general, with instructions to take such action as was deemed necessary.

The President presented a paper on "Adulteration of Food," prepared by Dr. R. J. Farquharson, which was read, accepted and ordered printed in the biennial report of the Board.

Dr. Lewellen, of the Committee on Forms, reported a circular on "Treatment of the Drowned," recommending its adoption and that two thousand copies be printed for distribution. The report was adopted.

Dr. Hull, of the Standing Committee on Ventilation, submitted a paper which was read and ordered printed in the biennial report of the Board, but at the special request of the author was referred back to the committee.

Drs. Dickinson, Clark, Lewellen, and Reynolds, of the standing committees, reported progress, and were granted further time to complete their reports, and when made they were ordered printed in the biennial report of the Board.

Dr. Clark, of the Committee on Order of Business, submitted the following report, which was adopted:

1. Calling the roll.
2. Reading minutes of last meeting.
3. Unfinished business.
4. Communications read and referred.
5. Bills presented and acted upon.
6. Reports of standing committees; to-wit,

   Food, Drinks and Water supply—Dr. Dickinson.
   Ventilation—Dr. Hull.
   Education—Dr. Roberts.
   Sewerage—J. L. Loring.
   Epidemic, Endemic and Contagious Diseases—Dr. Clark.
   Slaughter-houses—Dr. Lewellen.
   Legislation—Dr. Robertson.
   Library—Drs. Lewellen, Dickinson, and Hull.
   Forms—Drs. Lewellen, Dickinson, and Secretary.

7. Reports of special committees.
8. New business.
9. General business.
10. Election of officers.

On motion, the nomenclature of the National Board of Health and Royal College of Physicians, was adopted as that of this Board, and it was ordered that all returns required to be made by physicians to the clerk of the courts and health physicians of local boards to the State Board, under the provisions of chapter 151, laws of 1880, shall conform to said nomenclature.

Dr. Reynolds was assigned to prepare a consolidated report on scarlet fever in southern Iowa.

Dr. Dickinson was appointed a committee, with the Secretary, to select rooms in the new capitol for the use of the State Board.

The following officers were elected:

President—Dr. W. S. Robertson.

Secretary—Dr. R. J. Farquharson.

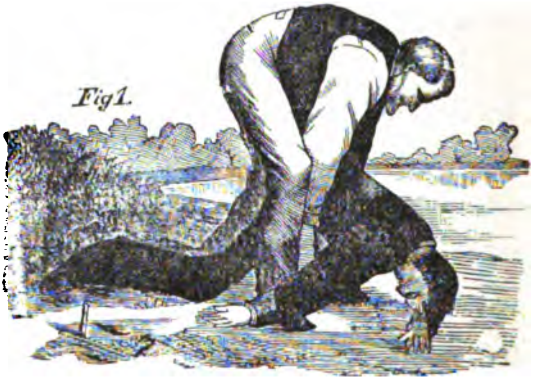
A vote of thanks was unanimously tendered L. F. Andrews for his efficient services during the year, and it was ordered that he be retained for six months, to assist the Secretary elect.

TREATMENT OF THE DROWNED.

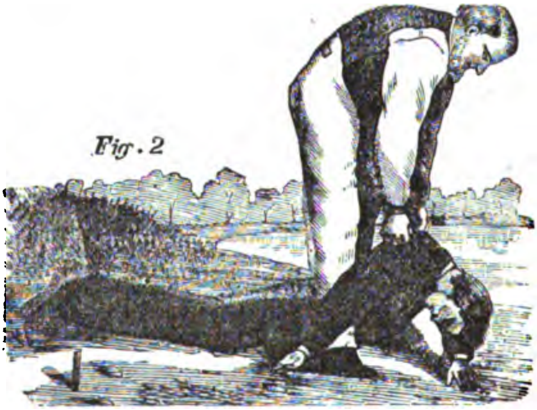
Pursuant to instructions of the Board, the following circular on treatment of the drowned was printed in pamphlet form, and also on stiff paper in placard form, for posting up in public places.

[CIRCULAR 24A.]

TREATMENT OF THE DROWNED—TWO THINGS TO BE DONE: RESTORE BREATHING; RESTORE ANIMAL HEAT.



RULE 1. **Remove all obstruction to breathing.** INSTANTLY loosen or cut apart all neck and waist bands; turn the patient on his face, with the head down hill; stand astride the hips with your face toward his head, and, locking your fingers together under his belly, raise the body as high as you can without lifting the forehead off the ground (Fig. 1), and give the body a smart jerk to remove mucus from the throat and water from the windpipe; hold the body suspended long enough to slowly count ONE, TWO, THREE, FOUR, FIVE, repeating the jerk more gently two or three times.



RULE 2. Place the patient face downward, and maintaining all the while your position astride the body, grasp the points of the shoulders by the clothing, or, if the body is naked, thrust your fingers into the armpits, clasping your thumbs over the points of the shoulders, and **raise the chest as high as you can** (Fig.

2) without lifting the head quite off the ground, and hold it long enough to *slowly* count ONE, TWO, THREE. Replace him on the ground, with his forehead on his flexed arm, the neck straightened out, and the mouth and nose free. Place your elbows against your knees and your hands upon the sides of his chest (Fig. 3), **over the lower ribs, and press downward and inward with increasing force** long enough to slowly count ONE, TWO. Then suddenly let go, grasp the shoulders as before and raise the chest (Fig. 2); then press upon the ribs, etc. (Fig. 3). These alternate movements should be repeated ten to fifteen times a minute for an hour at least, unless breathing is restored sooner. Use the same regularity as in natural breathing.

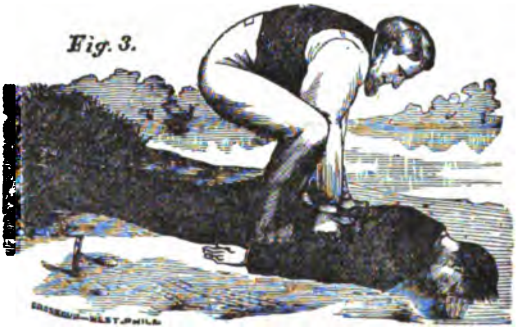


Fig. 3.

RULE 3. After breathing is commenced, RESTORE THE ANIMAL HEAT. Wrap him in warm blankets, apply bottles of hot water, hot bricks, or anything to restore heat. *Warm the head nearly as fast as the body, lest convulsions come on.* Rubbing the body with warm cloths or the hand, and slapping the fleshy parts, may assist to restore warmth, and the breathing also. If the patient can SURELY swallow, give hot coffee, tea, milk, or a little hot sling. Give spirits sparingly, lest they produce depression. Place the patient in a warm bed, and give hin plenty of fresh air; keep him quiet.

BEWARE!

AVOID DELAY. A MOMENT may turn the scale for life or death. Dry ground, shelter, warmth, stimulants, etc., at this moment are nothing—ARTIFICIAL BREATHING IS EVERYTHING—is the ONE REMEDY—all others are secondary.

Do not stop to remove wet clothing before efforts are made to restore breathing. Precious time is wasted, and the patient may be fatally chilled by the exposure of the naked body, even in the summer. Give all your attention and effort to restore breathing by forcing air into and out of the lungs. If the breathing has just ceased, a smart slap on the face, or a vigorous twist of the hair, will sometimes start it again, and may be tried incidentally, as may, also, pressing the finger on the root of the tongue.

Before natural breathing is fully restored, do not let the patient lie on his back, unless some person holds the tongue forward. The tongue by falling back may close the windpipe and cause fatal choking.

If several persons are present one may hold the head steady, keeping the neck nearly straight; others may remove wet clothing, replacing at once clothing which is dry and warm; they may also chafe the limbs, and thus promote the circulation.

Prevent friends from crowding around the patient and excluding fresh air; also from trying to give stimulants before the patient can swallow. The first causes suffocation; the second, fatal choking.

DO NOT GIVE UP TOO SOON: You are working for life. Any time within two hours you may be on the very threshold of success without there being any sign of it.

In suffocation by smoke or any poisonous gas, as also by hanging—proceed the same as for drowning, omitting effort to expel water, etc., from the windpipe.

In suspended breathing from effects of chloroform, hydrate of chloral, etc., proceed by Rule 2, taking especial pains to **keep the head very low,** and preventing closure of the windpipe by the tongue falling back.

The foregoing method originally published by the State Board of Health of Michigan, being a modification of that adopted by the Life-Saving Society of New York, has the sanction of other State and city boards of health, and is fully indorsed by the State Board of Health of Connecticut, Wisconsin and Iowa, and printed for general distribution as a life-saving measure.

Address STATE BOARD OF HEALTH,
Des Moines, Iowa.

PRESERVE THIS.

Study it thoughtfully, in order to act efficiently, if occasion requires.

Thanks are due Dr. Henry B. Baker, Secretary of the Michigan State Board of Health, for the use of the cuts necssary to illustrate the foregoing circular, and for the privilege of making stereotype copies of the same for the future use of this office.

By direction of the State Board of Health the Circular to Health Physicians was received and reprinted, to-wit:

[FORM 8B.]

CIRCULAR TO HEALTH PHYSICIANS.

OFFICE OF THE SECRETARY
OF THE IOWA STATE BOARD OF HEALTH,
DES MOINES, June 10, 1881.

To the Health Physician:

SIR—I herewith send you a blank form (1C) for your use in making your annual report to this Board, required by law.* *for the year ending October 31.*

PLEASE FILL OUT AND RETURN THIS REPORT AS SOON AS POSSIBLE AFTER OCTOBER 31ST.

This blank form is for diseases like one sent to the clerk of your board, but your report should be made according to your best knowledge, leaving his report to be made by him according to his best knowledge. If each of you will report the cases reported to himself, we will then know the total number of cases reported, and to which class of officers the greatest number of reports are made; and if we have estimates of the probable number of cases not reported, made by two different persons in each locality, we may gain a good idea of the actual condition of the public health and of the public health service in the different parts of the State. General truths concerning the entire State cannot well be reached by compilation of reports when only the best or poorest townships of many counties are represented; it is therefore important that every health officer shall make a report. For a similar reason, *every blank should be filled.* If no sickness has occurred within your jurisdiction, or if there has been *no case* of any disease concerning which a report is asked, it is important to state that fact, and the reason, if known, for such healthfulness, and also the population, etc., in the blank spaces provided for those statements im the report. IT IS ALSO IMPORTANT TO FILL THE BLANKS FOR THE PROBABLE NUMBER OF CASES OF DISEASES NOT REPORTED TO YOU. As these reports are to be compiled and published, it is necessary to have uniform blank forms, because it is impossible to compile from letters and postal cards, on account of the time required to search through them; and for this reason every fact to which the report relates should be entered in its proper place *in the report,* on the blank, and not sent on scraps of paper, by letter, or on postal cards.

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*Chapter 151, laws of 1880, section 15. It shall be the duty of the health physician, and also the clerk of the local board of health of every incorporated town, and also the clerk of the local board of health in each city or incorporated town or village, in the State, at least once a year, to report to the State Board of Health their proceedings, and such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of health.

Your report should be made out *for the exact territory over which your board has jurisdiction,* and for which you are the health officer, and it *should not include* anything outside of such jurisdiction. A township board of health *does not have jurisdiction in an incorporated town or city,* even though such city or town be situated within the limits of the township; neither has a city board of health jurisdiction in territory outlying the city. If you have been appointed health officer for a township and an incorporated city or town, it is necessary that you make separate reports for each, just as separate as if they were made by different persons.

Please ascertain and report, as completely as possible, the causes of all fires within your jurisdiction during the year; also the number of lives lost, and of persons injured in consequence thereof.

Your attention is respectfully asked to chapter No. 151, laws of 1880, relative to duties of health officers of cities and towns. It is recommended that your board of health have copies of the law, and rules and regulations of the State Board, thoroughly distributed within your jurisdiction, in order to call attention to the subject and secure material for a complete record in your office relating to diseases which endanger the public health. You should have a record-book in which to record cases of dangerous diseases, like that of the clerk. See Circular 14B.

It is not expected that it will always be possible to fill every column of your record; but so much as it is possible to learn concerning each case should be recorded and reported, because the single fact of the number of cases of sickness from each such disease will be of value in connection with the records of death and other knowledge collected at this office. It is hoped that you will not fail to record all cases of such diseases under your own care.

In case any disease should appear in your locality as an epidemic, please make a special report of the fact to this office as soon as possible. It is also expected that you will study and record the conditions coincident with the rise, progress, and decline of any such epidemic, and in due time report the same to this Board. Concerning every such occurrence you should be able to report some facts which will be of use in advancing the cause of public health.

Your local board has two kinds of functions: 1. To utilize for your own community the sanitary knowledge already accessible, by restricting communicable diseases, as [directed in Circulars 17B, 18B, and 21B; by recording all cases of diseases which endanger public health, that their conditions may be studied, and prevention learned; by inaugurating measures for preventing sickness and death from ordinary diseases in your community; in improving your sanitary and hygienic condition. 2. By giving to the State Board the result of your experience and research, thus adding to the general fund of knowledge, which will be compiled and returned to local boards in the reports of the State Board.

Repeated inquiries are made at this office whether or not health physicians are expected to treat cases of epidemic or contagious diseases which come under the restrictive powers of a local board, or to treat sick paupers of a township. Such is not the intent of the law. That is a matter entirely within the control and discretion of the sick or their friends, except as to paupers, for which provision is made under section 1361 of the Code of 1873.

By direction of the State Board of Health.

Very respectfully,

R. J. FARQUHARSON, *Secretary.*

Please preserve all circulars which you reveive from this office.

Direct all correspondence with this office to "State Board of Health, Des Moines, Iowa."

DISEASES IN IOWA—SPECIAL CORRESPONDENCE.

IN order to secure a more accurate knowledge of diseases in Iowa, and incidents which may be supposed to influence the rate of sickness or death, it was decided by the State Board to secure a corps of special correspondents, located in different parts of the State, which, irrespective of any official relation such correspondents may hold to local boards of health, will embrace men who are in full sympathy with the objects for which this Board is laboring; to-wit, the extension of sanitary knowledge among the people, and the education of the people in the nature and cause of preventible diseases—men who by direct acceptance of this office become identified with the Board—to whom it can appeal for any desired information, and from whom may be expected such special interest in its work as will prompt to the free communication of any facts they may deem worthy of its notice.

A circular of invitation was sent to physicians in various parts of the State, to become special correspondents. The promptness and cordiality of their acceptance is a pleasing indication that the members of the profession are in hearty accord with the object and purpose of the State Board of Health.

To these correspondents the following circular was sent:

[CIRCULAR 23B.]

TO SPECIAL CORRESPONDENTS, RELATIVE TO DISEASES IN IOWA IN 1880.

OFFICE OF
THE STATE BOARD OF HEALTH,
DES MOINES, March 20, 1881.

To the Correspondents of the State Board of Health:

GENTLEMEN—This Board desires to have, and to place upon record for purposes of future study in connection with records of deaths and of meteorological conditions, statements, for as many different localities in the State as possible, of the diseases in Iowa during the year 1880. Will you have the kindness to send, as soon as is convenient, your replies to the following questions? Please use the stamped envelope enclosed herewith, and leave all additional postage to be paid at this office. In replying, it will not be necessary to repeat the questions, but simply to refer to the circular by number and to each question by number.

1. If you live in a city or incorporated town, what do you estimate the number of inhabitants of said city or town at the middle of the year 1880?

2. Among these inhabitants above mentioned, what do you estimate the number of deaths from all causes during the year 1880?

3. Please state the territory for which your replies to the following questions are made?

4. Among the people of your locality, considering the increase or decrease of population, was the amount of *sickness* from all causes during the year ending December 31, 1880 *greater*, *less*, or about *the same as the average* during previous years? If not the same, how much was it increased or diminished?

5. Compared with previous years, and from all causes, was the ratio of *deaths* to inhabitants during the year 1880, *greater*, *less*, or about *the same as the average?* If not the same, how much was it increased or diminished?

6. What disease, or causes of death, were *more* than usually prevalent during the year 1880?

7. If you can assign any *cause for* the *unusual prevalence* of any disease, please do so.

8. What diseases, or causes of death were *less* than usually prevalent?

9. To what do you attribute the lessened prevalence?

10. From what diseases or causes was there *more* than the usual mortality during the year 1880?

11. If you can assign any *cause for* the *unusual mortality* from any disease, please do so.

12. From what diseases or causes was there *less* than the usual mortality?

13. To what do you attribute the lessened mortality?

14. Please mention dates of the occurrence in 1880 of all diseases attended with an *unusually high or low rate of mortality*, and state whether the rate was high or low.

15. Please mention dates of the occurrence in 1880 of all *diseases not usually occurring in your locality.*

16. State number of cases of each of these diseases; viz., small-pox, cholera, scarlet fever, typhoid fever, measles, whooping-cough, cerebro-spinal meningitis, diphtheria, and any other epidemic, endemic, contagious, or infectious disease that appeared during 1880. (Facts are especially desired, but opinions are better than no statements, though it will be well to state them as opinions.)

17. Of the eight diseases mentioned above, *name those of which no case appeared* during the year 1880.

18. For each of months in 1880, please give a summary statement of the diseases which occurred, naming them in the order of their prevalence—greatest first.

19. During the year 1880, *what diseases* occurred, *at what time*, and *to what extent*, *among animals?*

20. Please give a summary statement of the meteorological conditions during

the year 1880, specifying, if possible, the general characters for each month, and noting any peculiar or unusual condition.

21. Please state the facts concerning the *soil moisture* in your locality, during each of the months in the year 1880, *without reference to previous years*, but comparing the months in 1880 with each other. Group them in order—driest first.

22. *Compared with previous years*, in what months of the year 1881 was the *soil* in your locality *unusually dry ?*

23. *Compared with previous years*, in what months of the year 1881 was the *soil* in your locality *unusually moist ?*

24. In your locality, what is the *usual average depth of earth above the ground water*, as indicated by distance down to water in wells, streams, etc.? If different parts of your locality vary greatly, please answer for such different parts.

25. Without reference to previous years, please state the facts concerning the *depth of earth above the ground water*, nearest the surface, in your locality, during each month of the year 1881, as indicated by distance down to water in wells, streams, etc., or by other facts. How many feet and inches do you estimate it, in each month?

26. Compared with previous years, in what months of the year 1880 was the *ground water* in your locality *unusually high ?*

27. Compared with previous years, in what months of the year 1880 was the *ground water* in your locality *unusually low ?*

28. Please communicate facts bearing upon, or cases illustrating the causation or communicability of diseases.

Any suggestions which you may feel inclined to make concerning methods which seem practicable for the prevention of sickness or deaths, in your locality, or in this State, need not be withheld, but are earnestly solicited.

As stated after question 16, in the absence of positive knowledge, opinions are desired. The fact that it will be difficult, and sometimes impossible, to give the information asked for, is well understood; the importance of the subject, however, warrants the effort, which it is believed will not always be barren of results, but will tend to accumulate data which eventually will be of great value to the people.

By direction of the State Board of Health,

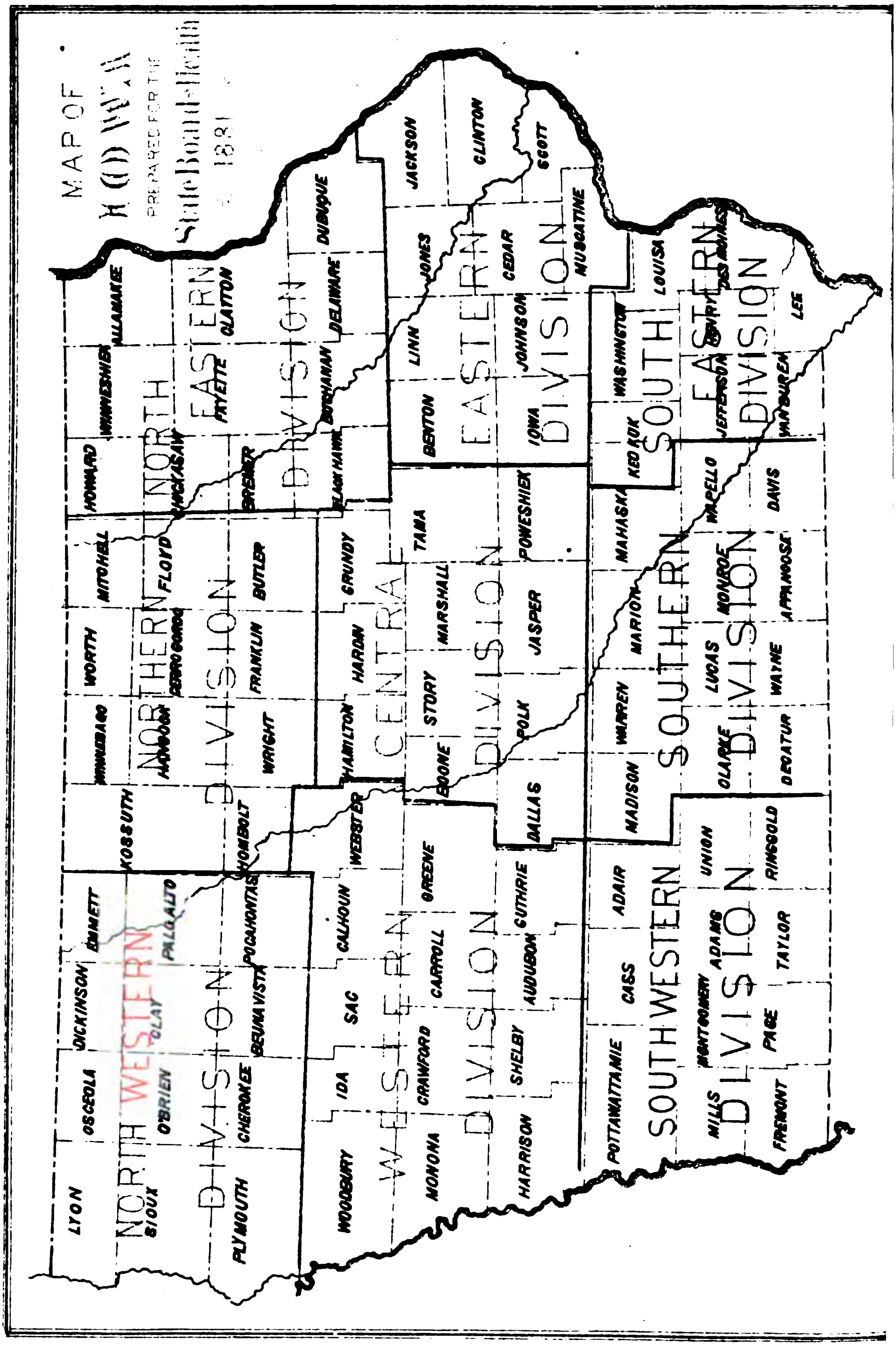
Very truly,

L. F. ANDREWS, *Secretary.*

It was not expected that complete and accurate statements could be secured upon which to make a compilation of results. The correspondents were necessarily without data or information—in fact had no knowledge of what would be required in advance. Their replies are, therefore, based on memory. But a beginning has been made, and it is believed that correspondents will prepare themselves by observation and memoranda made when the facts occur, so that more comprehensive and valuable information will be obtained, the value of which depends entirely upon the accuracy of the statements and the number of localities. Effort will be made to increase the number and area of correspondents, so that every section of the State may be represented.

For convenience of reference, and comparison, the replies from correspondents have been grouped in geographical divisions (see map).

It should be borne in mind that the correspondents are alone responsible for their statements. They have been selected with care, and embrace many physicians who hold high rank in the profession.


MAP OF
IOWA
PREPARED FOR THE
State Board of Health
1881
NORTH EASTERN DIVISION
EASTERN DIVISION
SOUTH EASTERN DIVISION
NORTHERN DIVISION
CENTRAL DIVISION
SOUTHERN DIVISION
NORTH WESTERN DIVISION
WESTERN DIVISION
SOUTHWESTERN DIVISION
ALLAMAKEE
WINNESHIEK
HOWARD
CLAYTON
FAYETTE
CHICKASAW
DUBUQUE
DELAWARE
BUCHANAN
BREMER
BLACK HAWK
JACKSON
CLINTON
SCOTT
JONES
CEDAR
MUSCATINE
LINN
JOHNSON
BENTON
IOWA
LOUISA
DES MOINES
HENRY
WASHINGTON
JEFFERSON
KEOKUK
LEE
VAN BUREN
MITCHELL
FLOYD
BUTLER
WORTH
CERRO GORDO
FRANKLIN
WINNEBAGO
HANCOCK
WRIGHT
KOSSUTH
HUMBOLT
GRUNDY
TAMA
POWESHIEK
HARDIN
MARSHALL
JASPER
STORY
POLK
HAMILTON
BOONE
WAPELLO
DAVIS
MAHASKA
MONROE
APPANOOSE
MARION
LUCAS
WAYNE
WARREN
CLARKE
DECATUR
EMMETT
PALLO ALTO
POCAHONTAS
DICKINSON
CLAY
BEUNA VISTA
OSCEOLA
O'BRIEN
CHEROKEE
LYON
SIOUX
PLYMOUTH
WEBSTER
CALHOUN
GREENE
SAC
CARROLL
IDA
CRAWFORD
WOODBURY
MONONA
DALLAS
GUTHRIE
AUDUBON
SHELBY
HARRISON
MADISON
UNION
RINGGOLD
ADAIR
ADAMS
TAYLOR
CASS
MONTGOMERY
PAGE
POTTAWATTAMIE
MILLS
FREMONT

GEOGRAPHICAL DIVISIONS OF THE STATE.

Giving a list of the counties in each division; and formed for facilitating the study of causes of sickness and death.

North-eastern Division.	Eastern Division.	South-eastern Division.	Northern Division.	Central Division.	Southern Division.	North-western Division.	Western Division.	South-western Division.
Allamakee	Benton	Des Moines	Butler	Boone	Appanoose	Buena Vista	Audubon	Adams
Black Hawk	Cedar	Henry	Cerro Gordo	Dallas	Clarke	Cherokee	Calhoun	Adair
Buchanan	Clinton	Jefferson	Floyd	Grundy	Davis	Clay	Carroll	Cass
Chickasaw	Iowa	Keokuk	Franklin	Hamilton	Decatur	Dickinson	Crawford	Fremont
Clayton	Jackson	Lee	Hancock	Hardin	Lucas	Emmet	Greene	Mills
Delaware	Johnson	Louisa	Humboldt	Jasper	Madison	Lyon	Guthrie	Montgomery
Dubuque	Jones	Van Buren	Kossuth	Marshall	Mahaska	O'Brien	Harrison	Page
Fayette	Linn	Washington	Mitchell	Poweshiek	Marion	Osceola	Ida	Pottawattamie
Howard	Muscatine		Winnebago	Polk	Monroe	Palo Alto	Monona	Ringgold
Winneshiek	Scott		Worth	Story	Wapello	Plymouth	Sac	Taylor
			Wright	Tama	Warren	Pocahontas	Shelby	Union
						Sioux	Webster	
							Woodbury	
Pop. 237,676	Pop. 271.735	Pop. 188,094	Pop. 97,945	Pop. 230,723	Pop. 216,725	Pop. 67,090	Pop. 147,898	Pop. 189,916

NORTHEASTERN DIVISION.*

REPLIES BY FREDERICK BECKER, M. D., OF CLERMONT, FAYETTE COUNTY.

†1. According to the United States census of 1880, six hundred and fifty-six inhabitants.

2. Six, of which number two were accidental.

3. For the incorporated town of Clermont, except where otherwise noted.

4. Less, from two to three per cent.

5. About the same from all causes, but less from disease by from two to three per cent.

6. Pneumonia and influenza.

7. A greater dryness of the atmosphere.

8. All general diseases, except as noted in answer six.

9. During the greater part of the year a lessened rain-fall.

The following answers will include the whole of Clermont township:

10. From pneumonia in the aged.

11. A greater dryness of the atmosphere caused an increase in pneumonia in the aged.

12. From diphtheria.

13. To a greater dryness of atmosphere.

14. January and February, pneumonia, increased mortality; July and August, gastro-enteritis and entero-colitis, with increased mortality; April and May, measles, with no mortality.

15. Measles in April and May; typhoid fever in July.

16. Scarlet fever, 2; typhoid fever, 2; measles, 30; cholera morbus, gastro entritis and entero colitis over 100 cases; influenza 75 to 80 cases. Of these diseases there may have been more, a good many do not come under the observation of a physician.

17. Small-pox, cholera asiatica, whooping-cough, cerebro-spinal meningitis, diphtheria.

18. *January*—Broncho pneumonia, catarrhal pneumonia, and with typhoid erudition, catarrhal croup and typhlitis.

February—Pneumonia and bronchitis in adults; and children, sore throats, colds.

March—Catarrhal bronchitis and pneumonia in adults: and children, gastric catarrh.

April—Pneumonia, bronchitis, rheumatism, uterine hemorrhage, erysipelas, gastritis, scarlet fever, measles, intermittent fever.

May—Measles, erysipelas, intermittent fever, rheumatism, bronchitis.

June—Diorrhœa, otitis interna, intermittent fever, dysentery, rheumatism, bronchitis.

July—Diarrhœa, dysentery, gastro-enteritis, congestion of brain, intermittent fever.

August—Gastro-enteritis, dysentery, diorrhœa, intermittent fever, congestion of brain.

September— Intermittent fever, diarrhœa, laryngitis, pneumonia.

October — Intermittent fever, cistitis, dysentery, gastro-enteritis, diarrhœa, pneumonia, laryngitis, rheumatism.

November—Pnuemonia, cistis, pleurisy, laryngitis.

December—Laryngitis, influenza, pneumonia, pleurisy.

19. Cholera among swine and chickens during the months of October, November, and December, and epizootic among horses during November and December.

20. As near as I remember, January, February and March were dry, with frequent and rapid changes between cold and warm, March being unusually dry and warm; April cold and more rain-fall; June the moistest month in the season, having the heaviest rain-falls of any month in years, and the highest water, especially the latter part of the month; July continued in heavy rain-fall during the first half, the latter half being dry and hot; August, very hot and dry, both day and night, the thermometer ranging from 90° to 100° in the shade; September continued hot during the day from 85° to 95°, with cooler nights; October hot from 80 to 90° fore part, and dry; November cold and dry from freezing to 10° below zero

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*For counties comprising this division see page 79 and map.

†The figures beginning each paragraph refer to the questions in Circular 23B, on pages 75-77.

nights; December colder from freezing to 30° below zero both day and nights, with light snow-falls during the winter.

21. Dry months were, September, August, November, December, October, January, March, February, May, and latter part of July as regards rainfall; moist months were, June, April, and fore part of July.

22. September, November and December.

23. In June and July.

24. From 25 to 85 feet.

26. In June and July.

27. In November and December.

In regard to question number 25 I have no positive knowledge, any more than the general, given in answering the foregoing questions numbers 21 to 27.

The answers given to question number 18 are taken from my case record, and are, as far as my practice, as wellas my general knowledge reaches, nearly correct.

In regard to the prevention of disease I would say that it is my view, that disease and death are especially induced by the use of tobacco, whisky, mastubation and filth. Tobacco and whisky induce especially insanity, paralysis, dysentery in infants; sunstroke, chronic ophthalmia, chronic diphtheria, etc.

Masturbation and tobacco are the causes of two deaths of every three from consumption.

Filth is the cause of a majority of deaths from typhoid fever and diphtheria.

Tobacco and whisky used by a father or a mother, will induce deformity, paralysis, insanity and diarrhœa and dysentery in infants and children, and will most certainly increase the death rate in that class of diseases.

I would upon the ground of these experiences respectfully suggest the education of the young to abstain from these vices and injurious habits by suitable works being introduced in our public schools, and for home reading in families.

I am, gentlemen, your most obedient servant.

Fredrick Becker, M. D.

Clermont, Fayette County.

REPLIES FROM JOHN SHEPHERD, POSTVILLE, ALLAMAKEE COUNTY.

1. Incorporated city, 732.

2. Six; 2 from organic diseases of the heart; 2 from cholera infantum; 1 membranous croup, and one said to be broncho-pneumonia.

3. Part of counties of Allamakee, Clayton, Fayette and Winneshiek, including a circle of five miles round Postville.

4. I think rather under the average; at any rate not above.

5. Compared with the fall and winter of 1877, when we had a very fatal epidemic of diphtheria. The death rate has been light, and in 1880 rather under the average.

6. Cholera infantum, typhoid fever, scarlet fever, scarlatina and not more than usual, and the first not so fatal as in some previous years. The fatality of the second confined to one family who lost three. No deaths from the other two.

7. I cannot.

8. Cholera infantum.

9. I cannot say unless it was that the temperature was not so continuously high and dry as in some previous years. "That is only my opinion."

10. There was no unusual mortality in 1880.

12. Cholera infantum.

13. Answer to question 9 embodies all I can say.

14. The greatest number of deaths from any type of disease occurred in August and September; 2 children from cholera infantum, and in November and December 3 persons from typhhoid fever. Rate low in both cases.

15. None.

16. In town 7 cases of typhoid fever. In the country about 12; cerebro-spinal meningitis, 1; congestion of brain, 1; some sporadic cases of mild diphtheria, simple scarlatina, whooping cough, intermittent fever, pneumonia and bronchitis. The number of the last six I cannot give.

17. Small-pox, cholera and measles.

18. *January*—Scarlatina and pneumonitis.

February— Bronchitis, scarlatina and pneumonitis.

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*The figures beginning each paragraph refer to questions in Circular 23B, on pages 75-77.

March—Bronchitis, pneumonitis, scarlatina and diphtheria.

April—Intermittent fever. pneumonitis, and cerebro-spinal meningitis.

May and *June*—No diseas except a few slight cases of diarrhœa.

July—Cholera infantum and typhoid fever.

August—Cholera infantum, diarrhœa of adults and typhoid fever.

September—Cholera infantum and typhoid fever.

October—Pneumonia, bronchitis, typhoid fever, and rheumatism.

November—Intermittent fever, bronchitis, typhoid fever, croup, and pneumonia.

December—Intermittent fever, bronchitis, and typhoid fever.

19. What is called hog cholera prevailed more or less all the year, but to a great extent in spring and fall.

20. I cannot specify each month. The driest was September and October. The early part from January up to second week of July was unusually wet.

21. Answer to 20 is all I can say.

22. It was not unusually dry at any time during the year.

23. From January to second week of July.

24. Wells in town average from 12 to 25 feet. On some high farms from 25 to 50 feet.

25. I cannot say. They could not have been low from the frequent rains we had.

26. Answer to 23 is all I can say.

27. It was lowest for 1880 in September and October, but not unusually so when compared with former years.

28. I believe the cause of some diseases is to be found in a neglect of careful sanitary measures, such as filthy alleys, back yards, and privies, many of which are badly kept, and often located in too close proximity to wells. Many wells are very imperfectly protected from surface water and filth. From such negligent sanitary conditions, the medical attendant on the family where the three fatal cases of typhoid fever occurred attributes the malignant character of the disease.

The cause of the six deaths in town is given in answer No. 2. The country deaths resulted from typhoid fever, 3; active congestion of the brain, 1; paralysis agitans, 1 (duration over two years, ending in consumption); senile decay, 2; accidental, 1; organic heart disease, 1; in all, 9, with six in No. 2. total 15. Deducting the three from organic disease of the heart, one from paralysis agitans, two, senile decay, and one killed by accident, in all seven, the death rate from lymphatic and other acute diseases was light, considering that the district embraced is very thickly peopled. The number of deaths given from all causes is as near correct as known to me, and as far as I can find out.

Please pardon me for sending so imperfect a statement regarding so important a matter.

Yours very respectfully,
JOHN SHEPHERD, M. D.

Postville, Allamakee Co., April 15, 1881.

REPLIES OF J. B. DARLING, M. D., OF LAPORTE CITY, BLACK HAWK CO.

*1. Laporte City is an incorporated town of about 1,006.

2. Deaths in 1880, 10.

3. Laporte City.

4. Considering the increase, ratio some less.

5. Some less.

6. None.

7. ....

8. Diptheria and scarlatina heretofore, but in 1880 none.

9. To the sanitary condition of the place.

10. ....

11. ....

12. ....

13. No prevailing sickness.

14. ....

15. None.

16. Small-pox, cholera, scarlet fever, typhoid fever, measles, whooping cough, and all others, none.

17. None.

18. ....

19. Nothing unusual.

20. ....

21. A pleasant year all through.

22. At no time.

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*The numbers at the beginning of paragraphs refers to questions in Circular 23B, pages 75-77.

23. If anything, in June.
24. About 16 feet.
25. ....
26. Probably in June.
27. Probably in September.
28. ....

Deaths in 1880: Bright's Disease, 2; pneumonitis, 1; diarrhœa, 1; heart disease, 1; drowned, 2; apoplexy, 1; old age, 1; capillary bronchitis, 1; total, 10.

J. B. DARLING, M. D.

Laporte City, Black Hawk Co., March 30, 1880.

REPLIES OF A. MIDDLEDITCH, M. D., OF WATERLOO, BLACK HAWK CO.

*1. About 6,000.

2. Cannot answer sufficiently exact for any practical purposes.

4. About the same as during a few of the previous years; excepting there were, in 1880, more cases of diptheria than ever before, but 1879.

5. About the same on the average, but the ratio of deaths from diptheria was less than in 1879.

6. Diptheria.

7. We depend upon wells for our water supply. Our privy system is the old nuisance—privy vaults. Hence, the ground must essentially become more and more saturated year by year with filth; and the filth must year by year, more and more find its way to our wells. Is not this a sufficient cause, and will not the cause continue in force as long as victims may be found?

8. None to my knowledge.

14. So far as my own practice is concerned, the mortality was about as the general average; and the months of the greatest mortality among my patients were March and October.

16. Our health officer, Dr. Horton, will probably answer.

17. No small-pox, cholera, cerebro-spinal meningitis, so far as I am aware.

18. I had the most cases of diptheria in January, February, and October. Intermittent fever in March, April, and September.

24. In town, twenty to thirty feet; in the country from twenty to one hundred feet.

26. June and July.

28. Mr. M. had a family of five children, four of whom had diptheria, and three died. The one who escaped the disease was, at the very first, sent from home, and out of the neighborhood. After the four had had the disease, the house in which they were ill was thoroughly fumigated with sulphur, the walls whitewashed, the bedding washed, the carpets aired, etc. In about three months after this, the little girl went home and spent a Sunday, and in about a week she was taken very sick with diptheria, but recovered. Did she take the disease from germs still remaining about the house? From a single case, this question cannot, of course, be answered; and I give it that it may be put with other cases of a similar kind. That diptheria is contagious there can be no question; that many physicians, and nearly all the people, underrate the danger of impure air and impure water there is not a doubt. As to this danger I will give two or three examples which have come under my notice during 1880. Four of a family of five children were taken sick with malignant diptheria and died. One was sent from home and escaped. I analyzed a specimen of the water they had been drinking for several weeks, and found it loaded with animal matter. A large drove of hogs had for several years been fed around this well, and they had a wallowing place within eight feet of it. The well out of which the family had previously, to a few weeks before, used water for culinary purposes, had given out, or else its pump had; hence, the use of this contaminated water. There had not been a case of the disease in that neighborhood, seven miles from Waterloo, for years, and there has been none since. A man in the country where there had been no diptheria for a long time, moved his old house to make room for a new one, over the wallowing place of hogs in a hog yard; his whole family soon had diptheria, three of whom died, and the one that took the disease first, slept directly over the filthy spot above mentioned. A family eight miles in the country had typhoid fever, where there never before had been a true case of the disease. I analyzed their drinking water, which was unfiltered cistern water, and the cistern itself had become filthy for want of cleaning out. The water was badly contaminated with organic matter. These, and many others of a similar

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*The numbers at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

kind, which have come under my observation, convince me that there is no safety in the use of polluted water, or polluted air; that in towns, either the wells or privy vaults ought to be done away with; that in towns where public water-works which furnish pure water cannot be had, there is no better way to preserve wells from contamination than the dry earth or ashes system for privies, which can, in small cities, be managed with very little trouble, expense, and entire safety; and it seems to me, that this is one important direction in which the State Board of Health can, with great advantage, work, in the way of preventing contagious diseases and the consequent mortality. *Pure water, pure air, cleanliness—insured by force if they must be.*

Respectfully,

A. MIDDLEDITCH, M. D.

Waterloo, Black Hawk Co., March 28, 1881.

REPLIES FROM E. CARTWRIGHT, M. D., OF DECORAH, WINNESHIEK COUNTY.

*1. Estimated number of inhabitants in Decorah and suburbs, 4.559.

2. Deaths in 1880 from cemetery and undertaker's report, thirty-four, as near as I can estimate.

3. For the city and suburbs of Decorah.

4. About an average; have no record of previous years.

5. As in answer 4.

6. No epidemic; a few deaths from scarlet fever and diptheria in early winter.

16. In October diptheria appeared; small-pox, none; epidemic cholera, none; scarlet fever, 11; measles, 9; perhaps 20 cases; cerebro-spinal meningitis, none; diptheria, 13.

17. Five.

18. Greatest in October diptheria; can answer no farther.

19. In early part of November an epizootic among horses.

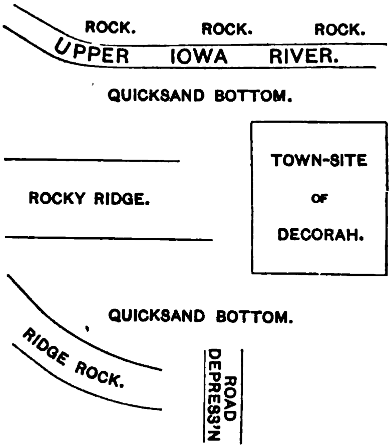
20. Have not the data.

24. On the bottom lands, 22 feet; on the rocky ridge, 60 feet.

We have to drill on rocky ridges from 60 to 80 feet before finding water.

Through the town is bed of creek usually dry in summer, called dry run from that circumstance, but last summer a small stream almost all the time.

On this quicksand bottom most of the wells are drive wells, and consequently water is clear; first we go through black vegetable mould four feet, then through a friable clay about fourteen inches; then gravel down to quicksand; but as privy vaults and drains become thicker how long before water becomes contaminated?



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*The figures at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

28. Diptheria broke out here in October. A family had been visiting in Wisconsin. Their children went to the public school. The youngest child and her school-mate sat at same desk; were taken on Saturday and one died the following Tuesday. All our cases can be traced to this. All of these cases were isolated as soon as type of disease was known.

Yours,

EARL WRIGHT, M. D.

Decorah, Winneshiek county, April 7, 1880.

REPLIES FROM S. N. BIXBY, M. D., OF STRAWBERRY POINT, CLAYTON COUNTY.

*1. Cass township, 1,504.
2. ....
3. Radius of ten miles.
4. Greater; about ten per cent.
5. Greater; about ten per cent.
6. Diphtheria.
7. Bad sanitation.
10. Diphtheria.
14. November and December—high.
16. A few cases of whooping-cough; a few cases of typho-malarial fever; and quite a number of isolated cases of puerperal fever.
17. Small-pox and cerebro-spinal meningitis.
19. Hog cholera—autumn months; epizootic—November and December.
22-23. First months, soil unusually wet; last months, soil unusually dry.
24. Fifteen to thirty feet.
26. First months of year high.
27. Last months of year low.
28. In our town, when the diptheria was quite prevalent during November and December the ground water was near surface; soil sandy and porous. The drainage from manure heaps, and especially from privy vaults penetrates the soil, impregnating the drinking water in wells. Cisterns should be preferred to wells, and vaults should not be dug.

Yours truly,

S. N. BIXBY.

Stvawberry Point, Clayton county, March 30, 1881.

REPLIES FROM H. N. SILL, M. D., OF STRAWBERRY POINT, CLAYTON COUNTY.

1. About seven hundred and fifty.
2. ....
3. About one and one-half miles square.
4. More.
5. One-ninth more.
6. Diphtheria.
7. I cannot; it was epidemic.
8. ....
9. ....
10. Diphtheria.
11. Diphtheria, epidemic.
12. Malarial.
13. September to November.
14. About September 10 to November.
15. ....
16. Diphtheria.
17. Small-pox, typhoid fever, measles, whooping-cough, cerebro-spinal meningitis.
18. Diphtheria September, October and November. Others cannot.
19. Epizootic among horses in October and November. Lung disease among hogs from June to November.
20. Cannot.
21. Cannot.
22. None.
23. July and August.
24. About twenty feet.
25. From four to sixteen feet. Months, I cannot state.
26. July and August.
27. None.
28. Cannot.

In the year 1879, about or over one and one-half per cent died in our township; viz., out of one thousand five hundred inhabitants there were sixteen deaths.

I regret that I cannot give it with greater accuracy.

Respectfully,

H. NEWELL SILL, M. D.

Strawberry Point, Clayton County.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, on pages 75-77.

REPLIES FROM D. G. DARNELL, M. D., OF WEST UNION, FAYETTE COUNTY.

*1. Incorporated town. Population, one thousand five hundred and fifty.

2. About thirty.

3. The incorporated town of West Union and West Union township.

4. About the same as previous years.

5. Same as the average.

6. Diphtheria.

7. Our streets, alleys, etc., were not in a good sanitary condition. We had considerable rain during the latter part of April and May, followed by high temperature of atmosphere, hence, rapid vegetable and animal decay.

8. Typhoid and malarial fevers.

9. At the time of year those diseases prevailed, we had a much better sanitary condition in our town and township.

10. Diphtheria.

11. Answer in Number 7.

12. Typhoid and malarial fever.

13. Answer in Number 9.

14. During the month of May diphtheria; a high rate of mortality.

15. No disease but what we have had.

16. Small-pox, scarlet fever, cholera and cerebro-spinal meningitis we had none; typhoid fever, but a few cases; measles, twenty-five to thirty cases; whooping-cough, thirty cases; diphtheria, twenty-five cases.

17. Small-pox, scarlet fever, cholera and cerebro-spinal meningitis.

18. Diphtheria in May; whooping cough in April and May, and measles in January, February, March and April.

19. Cholera appeared among chickens the entire year, but no disease among animals.

20. The meteorological condition was about the same as usual, save in May we had a higher temperature than usual; also, in November, a lower one.

21. Cannot give positive answer, but last of May and during month of June we had an unusual amount of rain. August, September, October, January, February and March; December, November, July, April, May and June.

22. August and September.

23. June.

24. Average, fifteen feet. Some parts vary greatly, say from five to sixty feet.

25. During May and June, say about five feet; during August and September, about twenty feet; the other months about the average, fifteen feet.

26. May and June.

27. August and September.

28. Diphtheria was brought to our town by a lady and her children who were visiting East where the disease prevailed. The entire family had diphtheria. Those members who had it very mild were permitted to go about the streets. A neighbor's boy carried milk to the family daily when they were sick, and he was attacked and died in a few days. One member of the family went to school, as I understand, when others were sick with the disease. Measles and whooping-cough were brought to our town by persons attending our schools.

Very respectfully, G. D. DARNELL.

West Union, Fayette County, May 16, 1881.

REPLIES OF N. S. CRAIG, M. D., OF MANCHESTER, DELAWARE COUNTY.

In response to your circular, allow me to state that I have been a resident of this place only since November 1, 1879, and, therefore, my answers will not be as complete as could be desired.

*1. The census gave us 2,270 population.

2. About twelve.

3. Manchester and vicinity—radius of four miles.

4. It was about the same as the average, though less than the year preceding, owing to the fact that diphtheria and scarlatina were prevalent in 1879.

5. About the same as the average.

6. None.

7. None.

8. As stated, we had very little fatal illness from diphtheria or scarlet fever in 1880.

9. To diminished intensity of disease, and to better (earlier) care in treatment.

10. None.

11. ....

12. None.

13. ....

14. In the first six months of 1880 we had a mild form of diphtheria, attended with a very low degree of mortality.

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*The figures beginning each paragraph refer to the questions in Circular 23B, on pages 75-77.

15. None occurred.

16. (Opinion.) No small-pox or cholera; two or three of cholera infantum; two scarlet fever; one typhoid fever; no measles; four whooping-cough; no cerebro-spinal meningitis; twelve to fifteen diphtheria.

17. Small-pox, cholera, cerebro-spinal meningitis.

18. Have no sufficient data.

19. Hog cholera occurred in the latter part of the year in our vicinity, but was not unusually fatal.

20. Have no data.

21. Have no data.

22. Have no data.

23. Have no data.

24. Eighteen to twenty-four feet.

25. Have no data.

26. Have no data.

27. Have no data.

28. I saw a well-marked case of typhoid fever in May. 1880 (not included in answers to 2, 16, as it was fifteen miles away), in which, without doubt, the causation was the presence of decaying vegetable matter in the cellar. The house was very favorably located for drainage; privy-vault in good order and at suitable distance and location from the house; no decomposing matter about the surroundings; no other cases in the neighborhood. Cellar cleansed and disinfected promptly, and patient made a good recovery. No other cases occurred. May have a suggestion in this connection to make later.

Yours, etc.,

N. S. Craig, M. D.

Manchester. Delaware County, June 6, 1881.

[Another correspondent from Manchester, who omits to attach his signature, sends the following replies:]

*1. Incorporated town; 2,270 inhabitants.

3. Only a part of three townships.

4. Less. The people say *very* much less.

5. As near as I can learn, it was considerably diminished.

6. Diphtheria.

7. Excessive wet weather in the early part of summer.

8. I am told that scarlet fever was less prevalent.

9. Do not know cause.

10. Diphtheria and dysentery.

11. Both diseases appeared in very malignant form, and both physicians and laymen were not sufficiently acquainted with their natures to use sufficient precaution.

12. Scarlet fever.

13. It appeared in comparatively mild form.

16. Scarlet fever, 2; cerebro-spinal meningitis, 1; diphtheria, 16; dysentery, 4.

17. Small-pox, cholera.

18. *September, October and November*—Diphtheria.

August and September—Dysentery.

March—Scarlet fever.

May—Rheumatic fever.

June and July—Chronic diseases were most violent, and again in November and December.

May, June, July, September and October—Malarial fever.

19. *October, November*—All the horses had the epizootic, quite mild.

20. January, February, and March, very mild and not much rain or snow; April, May, and June, wet; July and August, dry and hot; September, wet and hot; October, cool and dry; November and December, very cold. There was an unusual number of heavy thunder-showers in June.

21. Until the middle of July, the soil was very wet; then, until the middle of September, very dry. Driest, August and July; wettest, June.

28. A young lady met a physician on a train, who had just attended some severe cases of diphtheria. In four days she was taken with a very severe attack. There had been no cases in the locality where she had been staying. Four of the family into which she went—or rather, where she remained during her sickness—were taken with the same disease.

In another instance, a young lady was taken with diphtheria away from home. She was removed to her home, and three other members of the family took the disease.

Manchester, Delaware County.

——— ———, M. D.

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*The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

REPLIES FROM J. W. RUE, M. D., OF DELHI, DELAWARE COUNTY.

*1. Five hundred and twenty-four inhabitants.

2. One-half per cent, about.

3. My practice is about five sq. miles, of about 2,000 inhabitants.

4. Sickness about the average of previous years.

5. The same as the average.

6. Consumption.

7. Cannot answer.

8. Diphtheria.

9. I think the atmosphere was not so moist generally.

10. Same as No. 6.

11. Changing from cold to warm being sudden, causing colds and check of perspiration.

12. See No. 8.

13. I cannot answer.

14. Consumption; *high rate* in February, March, and April.

15. Typhoid fever; rate low, January, February, and March.

16. Typhus fever, 3; typhoid fever, 6; whooping-cough, 2; cerebro-spinal meningitis, 2; diphtheria, 2; scarlet fever, 1. (These were in my own practice, and not taken from any other physician's.)

17. Small-pox, cholera—to my knowledge, not any.

18. Have not kept any memoranda.

19. Among hogs, 1, 2, 3 months, congestion of lungs. It has been estimated that 20 per cent died in this locality. Horses, epizootic, only 2 deaths; but most severe in spring and fall.

20. I cannot give particulars.

21. The season was generally a dry one; cannot state by the month.

22. May, June, and July.

23. Cannot answer.

24. In wells, the average is about 65 feet; there are some 100 to 180 ft. deep.

25. Cannot answer.

26. Cannot answer.

27. Cannot answer.

28. I think the disease among hogs is mainly caused by not having proper care. I have examined several that were fat, and said to have died with cholera. I found in each case the throat and lungs congested, while the intestines and every other organ was in a normal condition. I have also noticed that the farmers who have lost the most by what they have termed hog cholera, were those who let their hogs sleep in a pile, as it were, or too many together, and come out in an exposed place to feed. Being in a state of perspiration, the pores all open, of course a most violent cold is the result.

The remedy suggests itself: 1. Provide warm and dry quarters to sleep in, and a dry, clean place to feed in, not exposed to storms. 2. Not to allow too many to sleep together, thus avoiding so much heat and perspiration.

Speaking generally of diseases among the people, this is a wide field to roam in. One cause is—and one of great importance—not attending to the laws of hygiene. I find that there are fully one-half, if not more, who do not even bathe themselves once in two to four months. With this one simple duty neglected, how can people expect to be healthy? Also, interference with the laws of nature by *mechanical means*, as producing abortions, tight lacing, etc., which would fill a volume to enumerate in detail, and perhaps would be deemed superfluous to carry out your present ideas.

I am sorry that I cannot answer your questions more satisfactorily, my time is so much taken up by my practice. I will try and contribute to you as much as I can to aid you in carrying out your purpose for the best interest of the people.

Yours truly,
G. L. RUE, M. D.
Delhi, Delaware County, June 1st, 1881.

REPLIES OF GEORGE H. FULLER, M. D., OF DELHI, DELAWARE COUNTY.

1. This town not incorporated; population of township nearly 1,274.

2. Ten or twelve, I think; I have no statistics.

3. Delhi, township.

4. Ten to twenty per cent increase.

5. Same as number four.

6. Typhoid, typho-malarial, and pneumonic fevers in various combinations, and general debility from malarial and zymotic poison.

7. The open winter of 1879-80 caused freezing and thawing, and hence decay and giving off of poisonous effluvia by decaying vegetable and other organic matter accumulating in and upon

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

the soil around dwellings. Our soil is sand or sandy loam, sometimes mingled with clay and gravel or limestone subsoil; usually drains well, and will receive a certain amount of organic matter without harm, but in an uncertain and varying period the soil around a house will reach the point of saturation, and then debility or more or less disease will be the result.

8. We had only sporadic, mild cases of scarlatina and diphtheria, and the cases of remittent form were mild and few.

9. The general settlement and cultivation of the soil is removing the malarial fevers, or modifying their forms. I do not know why we had less diphtheria, scarlatina, etc., though I think we are less liable than locations with a black, loamy soil; but other localities with soil similar to ours had such epidemics.

10. See answer to number six.

11. See number seven.

12. See number eight.

13. See number nine.

14. February and March. Typho-malarial fever and typhoid pneumonia; rate high.

15. Do not remember any such.

16. Scarlet fever, three or four; typhoid, four; and typho-malarial, two or three; whooping-cough, six or eight; diphtheria, twenty or thrity.

17. Small-pox, cholera (epidemic), measles. cerebro-spinal meningitis.

18. Have not sufficient memoranda to answer this.

19. Some "hog cholera" and "chicken cholera," so called, during summer and fall. Distemper among cats during fall and winter, which seemed analogous to typhoid fever.

20. Have not memoranda.

21. ....

22. ....

23. ....

24. Thirty to fifty feet; occasional wells twenty feet.

25. Have not memoranda.

26. ....

27. ....

In my opinion, a large proportion of cases of typhoid and typho-malarial fevers, pneumonia, scarlatina, diphtheria, cerebro-spinal meningitis, dysentery and diarrhœa would either be prevented or mitigated, and the general vigor of our population much increased, by a careful attention to the laws of hygiene, which are grossly violated by nearly every family. Great improvement could certainly be made, at a moderate trouble and expense, in the care of privies and excreta, and of kitchen and chamber slops, which, accumulating near dwellings and wells, and thrown upon a soil now so fast becoming saturated with organic matter, are constantly becoming more and more prolific causes of disease.

It seems to me that a cheap circular or pamphlet for general distribution among families, or for publication in the local newspapers, giving facts briefly as to how these things cause disease, and detailing practical *inexpensive* methods of avoiding them, such as families of moderate means could employ with a reasonable amount of trouble, would be of much benefit. An intelligent neighbor sets his privy on top of the ground, with no vault, has a box of road-dust and a trowel inside for constant use, and as soon as a wheelbarrow-load of the compost accumulates takes it to his garden or field. I use wood-ashes in the same way and have no odor or accumulations.

The same neighbor has a kerosene-barrel hung on a pair of old buggy-wheels so that it can be easily inverted; he lets it stand near the kitchen, where all kitchen and chamber slops can be thrown in it, and when half full, he easily wheels it on his garden and empties it. This I think much better than any spouts or pipes.

By calling attention authoritatively to these subjects, I think many residents of farms and villages would adopt some such means of protection. Occupants of tenement-houses, stores, etc., in our villages and cities, would doubtless need compulsion, and ought to have it.

GEO. H. FULLER, M. D.

Delhi, Delaware county, April 1, 1881.

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* The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

REPLIES OF F. REYNER, M. D., OF EPWORTH, DUBUQUE COUNTY.

I send the following answers some of which are necessarily imperfect from the fact that no complete records were kept; as questions of this nature were not anticipated from any quarter, therefore only approximate answers can be given.

*1. Three hundred and fifty.

2. Three.

3. Taylor, Vernon, Iowa and Center townships.

4. About the same as the average.

5. About the same as the average.

6. Pneumonia.

7. No cause to assign.

8. Typhoid fever.

9. To short autumn and early advent of winter.

10. From none.

11. Cannot.

12. From none.

13. ....

14. Pneumonia; mortality very low.

15. Not any.

16. Small-pox, none; cholera, none; scarlet fever, ten; typhoid fever, fourteen; measles, none; whooping-cough, eleven; cerebro-spinal meningitis, none; diphtheria, unknown for the reason that many physicians call all sore-throat diphtheria, and so do the common people. But in the past five years I have found but three cases of what *I* called *diphtheria*. Many cases, that others called diphtheria, I called ordinary pharyngitis.

17. Small-pox, cholera, cerebro-spinal meningitis.

18. ....

19. Swine plague, during autumn months. The prevalence general, but not very severe.

20. As this place is only sixteen miles from Dubuque, I refer you to the reports of the United States Signal Station at that point, as furnishing more accurate information than my memory can.

21. January, February and March, soil very dry; August and September, dry; April, May, June, July, November and December, moist.

22. February and March.

23. ....

24. Twenty feet. At some places water can be obtained at fifteen feet, and perhaps a few rods from there you have to go down fifty or sixty feet; and the same is the case over all this portion of the county.

25. January, fifteen feet; February, sixteen; March, eighteen; April, twenty; May, twenty-eight; June, nineteen; July, nineteen; August, eighteen; September, nineteen; October, eighteen; November, seventeen; December, eighteen.

26. ....

27. March.

28. ....

Yours truly,

F. Reyner, M. D.

Epworth, Dubuque county, July 2, 1881.

REPLIES OF WILLIAM H. FRANCIS, M. D., OF CASCADE DUBUQUE COUNTY.

I will give the answers to the questions in your circular as correctly as is possible for me to do.

*1. Town of Cascade, Iowa; incorporated; number of inhabitants, 762.

2. About fifteen.

3. Within a circuit of five miles surrounding Cascade.

4. Population about the same; sickness about same as previous years.

5. About the same as previous years.

6. From old age and infants.

7. Natural causes.

8. Cannot say.

9. No greater or lessened prevalence.

10. As No. 9.

11. No unusual mortality.

12. Same as above No. 9, 11.

13. Mortality unchanged.

14. There being no high or low rate of mortality; the same as No. 13.

15. No unusual disease occurred in this locality.

16. Only one case of typhoid fever that I know of—a girl of ten years who died. There were no deaths from any other disease mentioned in this number, nor can I say that any of the diseases named appeared in this locality.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

17. No case appeared in any of the eight diseases except the one named, typhoid fever.

18. No definite statement.

19. Did not hear of any diseases among cattle.

20. Nothing unusual except the long winter and deep snows.

21. Cannot answer this question.

22. In no month of 1880 was the soil unusually dry.

23. Not unusually wet or moist in any month.

24. The variation in earth above the ground water in this locality is very slight to the water in wells, say forty feet on an average. A stream running through this locality called the Maquoketa River. In some parts of it the stream runs through bluffs twenty or thirty feet above the surface; in other localities the earth and surface of the water is nearly on a level, and the water shallow.

25. About same answer as No. 24; cannot say the number of feet and inches. In the month of March, at the time of breaking up of ice, the water rises from four to six feet, and in the month of June it rose six feet.

26. The same months each year.

27. In the month of August, September and October the water is lowest every year as it was in 1880.

28. In the fall we have some few cases of intermittent fever. The cause may arise from some little marshy lands in the vicinity of dams at flouring-mills; nevertheless we might have fever and ague without these swamps.

I must here mention that there is an old slough behind the town that is not conducive to health, but the contrary. Its water stagnates in the summer and fall months. The odor from it is very offensive, and in case of an epidemic of any kind it would contribute largely to its increase, especially cholera. Outside of this our locality is very healthy.

In the year 1873, in the months of January and February, we had a visitation of small-pox, which killed about forty patients, young and old—perhaps the half of all attacked.

Respectfully submitted.

WILLIAM H. FRANCIS, M. D.

Cascade, Dubuque county, Iowa.

REPLIES OF A. A. MATHEWS, OF DYERSVILLE, DUBUQUE COUNTY.

*1. Incorporated town; population, 975.

2. Twenty or twenty-five.

3. The territory included by a radius of three or four miles around Dyersville.

4. About the same.

5. About the same as the average.

6. I believe pneumonia.

7. ....

8. ....

9. ....

10. ....

11. ....

12. ....

13. ....

14. Cholera infantum in June.

15. February, diphtheria.

16. Typhoid fever, a few cases; whooping cough, ditto; diphtheria, the same.

17. Small-pox, cholera, scarlet fever, measles, cerebro-spinal meningitis.

18. *June*—Cholera infantum.
February—Peculiar sore throat.

19. Disease among swine; very fatal in the summer and fall.

20. ....

21. ....

22. At no time.

23. In June and July.

24. Wells on this (east) side the river are from thirty to fifty feet deep; on the other side, which is more flat, from twenty to thirty.

25. ....

26. June.

27. No time.

28. Intestinal troubles in children which usually occur late in the summer, occurred here in greatest severity in June, when it was usually moist.

Regretting that my report is so incomplete, I am respectfully yours.

A. A. MATHEWS, M. D.

Dyersville, Dubuque county.

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*The figures at the beginning of paragraphs refers to Circular 23B, on pages 75-77.

REPLIES OF E. REITZ, M. D., OF SHERRILL'S MOUND, DUBUQUE COUNTY.

*1 I reside in Jefferson township, and also practice in adjoining town of Peru. Population of Jefferson, 1,585; Peru township, 1,071.

2. I have recorded seven deaths in my practice.

3. Territory of ten miles embracing Jefferson and Peru townships.

4. It was diminished thirty-three per cent.

5. It was less, about one to eighteen ratio.

6. Spasm: croup and cholera morbus.

7. Second month wet and foggy; seventh month hot and wet; also, eighth.

8. Cholera morbus less than 1879.

9. Because it was dryer in 1879 than in 1880.

10. From spasm: croup.

11. In four cases spasm—croup, called too late; one case tinea turned into convulsions and ended in hydrocelphgia; two infants with cholera morbus died in convulsions.

12. Cholera morbus.

13. The weather more favorable: intermittent febris symptoms generally fatal were not present.

14. Months four, five, six, nine, ten and eleven, none rate higher for rest.

15. No epidemic occurred.

16. Cholera infantum, twenty-seven cases; cholera morbus, fifteen cases; febris scarlet, sixteen cases; typhoid pneumonia, one case; diphtheria, twelve cases.

17. No small-pox, measles, whooping-cough nor cerebro-spinal meningitis.

18. Seventh and eighth months, cholera; twelfth month, scarlet fever; tenth month, typhus pneumonia; first, second and third months, diphtheria.

19. Among animals the hog disease made a clean sweep; horses were attacked with epizootic about the eleventh and twelfth months.

20. Noted nothing unusual meteorologically.

21. Dry fourth, fifth, eighth, eleventh and twelfth months; wet the rest.

22. Unusually dry the fifth and eleventh months.

23. Unusually moist second, seventh and ninth months.

24. Average about one hundred and forty feet.

25. I made no estimate whatever.

26. Water in wells higher months seventh and ninth.

27. Low during the dry months.

28. I have found most cases of cholera induced by febris intermittent. Scarlet fever I have found in small, unclean houses where families of eight to ten were living without any ventilation; cellars with foul smell, and cisterns unclean, the family using nothing but snow-water. Diphtheria and spasmodic croup previling during the cloudy, foggy weather. So far, I believe, the disease was inhaled.

E. Reitz, M. D.

Sherrill's Mound, Dubuque county, March 28, 1881.

REPLIES OF R. M. WADE, M. D., OF FARLEY, DUBUQUE COUNTY.

*1. This town is incorporated. The number of inhabitants is four hundred and seventy-one.

2. Seven; four of whom were consumptives.

3. Six miles square.

4. Increase about twenty per cent.

5. Deaths increased ten per centum.

6. Lung diseases; many with consumption.

7. A number of those who died with consumption had it for years.

8. Scarlet fever and diphtheria.

9. Mild winter—almost no snow.

10. From consumption.

11. I cannot tell, unless this locality develops consumption.

12. Puerperal peritonitis; pneumonia.

13. Better remedies used by the physicians.

14. January, March and May, high; June, February, April, July and August, low.

15. No diseases of unusual occurrence in 1880.

16. (*a*) small-pox, none; (*b*), none; (*c*), fifteen cases, no deaths; (*d*), twenty-one cases of typhoid—one death; (*e*), no measles in 1880, but in this year more

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

than one hundred; (*f*), twenty-eight cases of whooping-cough; (*g*), none; (*h*), none, no deaths. This question is answered from my books, and returned as facts.

17. Small-pox, cholera, cerebro-spinal meningitis, measles.

18. *January*, scarlet fever;
February, typhoid pneumonia;
March, pneumonia, whooping-cough;
April and May, typhoid, peritonitis, lung troubles;
June, no prevailing diseases;
July and August, puerperal peritonitis, mumps;
September and October, remittent, whooping-cough;
November and December, typhoid pneumonia.

To give a summary of all diseases during the year would take a week of steady writing and would occupy too much space.

19. In the months of October, November and December about one-half of all the hogs died of what is termed here "disease of the lungs, or lung fever." No prevailing disease among cattle. Considerable lung trouble among horses, but only four or five deaths.

20. January—precipitation 1.37 in.; an unusually large proportion in form of rain.
February—precipitation .80 inches; unusually low, nearly all in rain.
March—precipitation 2.03 inches; rather low—little snow.
April—precipitation 2.70 inches; low.
May—precipitation 3.24 inches; low.
June—precipitation 6.30 inches; rather high.
July—precipitation 5.19 inches; rather high.
August—precipitation 5.26 in.; rather high.
September—precipitation 5.95 inches; rather high.
October—precipitation 0.42 in.; very low.
November—precipitation 1.87 inches; low.
December—precipitation 1.18 inches; low.

SUMMARY—During winter there was very little snow. The temperature was unusually high; roads and ground were very muddy. The atmosphere was often humid and fogs were unusually prevalent. In the spring the weather was changeable; temperature above average and though fogs and rains were about as frequent as usual, the total precipitation was light. The early summer was very dry, to the material injury of crops; but late summer and early fall were wet again, to the injury of crops. Late fall and early winter were generally clear, cold and dry.

NOTE.—Precipitations were taken from the records of T. V. Smith, of Farley, Iowa.

21. May, April, November, December and October, August, July, June, March, February, January and September.

22. Soil was unusually dry in May, April and March.

23. Soil was unusually moist in September and June.

24. Ground-water is an indefinite term in Farley and vicinity. Farley is on a divide between Little Maquoketa River and North Fork. Maquoketa River is 500 to 550 feet above the Mississippi at Dubuque, and is about 1.125 feet above the sea; and is the highest point within one hundred miles in any direction. The limestone is covered with glacial drift and one or two minor superficial formations to a variable depth, averaging say twenty-five feet. Water is usually found in limestone and drift, at an average (but very variable) depth of sixteen to twenty feet, though many wells are drilled in limestone. A slough or basin of gentle slope passes through the northeast part of Farley and passes into Hickory Creek, which creek flows into the north fork of the Maquoketa at Dyersville.

25. In the absence of recorded observations, it can only be stated that several wells in that portion of Farley within the basin described in the last paragraph were exhausted in May and early June. "Ground-water" is an indefinite term here.

26. It is believed that wells have not contained an unusual depth of water at any time during 1880.

27. Wells were exhausted in May and early June more than usually occurs, except in uncommonly dry years.

28. This question is of a too general character, and open to controversy, for one to answer here, and is widely discussed in books. I have had no case in 1880 which would illustrate this question, but in the present year I have many illustrations.

R. M. WADE, M. D.

Farley, Dubuque county.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

EASTERN DIVISION.*

REPLIES OF SAMUEL A. OREN, M. D., OF MOUNT AUBURN, BENTON COUNTY.

Not having kept a diary, I am unable to answer correctly and minutely some of the questions, but will impart such information as I now possess:

†3. Cedar township, Benton county, and Big Creek township, Black Hawk county, Iowa.

4. Greater by about ten per cent.

5. Greater by about ten per cent.

6. Diphtheria and dysentery (infantile).

6. Filth in drinking water (*opinion*). While July and August were dry, the wells became low, and then a little freshet flooded our section, filling up many of the wells with surface water. A dry spell then soon reduced them, and the water in many of the wells was very filthy. Diphtheria then broke out along mill-ponds and cess-pools, and was very fatal. Dysentery was prevalent during the hot, dry weather previous to the diphtheria.

8. All lung troubles.

9. To the steady weather.

10. Diphtheria and (old age) diseases among old people.

11. Lung and typhoid, as well as malarial fever generally.

13. Absence of malarial effluvia.

14. *January to April*—Gastro-enteritis and bronchitis, which was low.

May and June—Malarial fevers and infantile bowel troubles generally—average.

July and August—Dysentery, which was above average as respects fatality.

Then came diphtheria, which lasted until about the middle of December, and was quite fatal.

16. One case of scarlet fever in August; 2 cases of *mongrel* typhoid fever in September; 12 cases of whooping-cough, 29 cases of diphtheria.

17. Small-pox, cholera, measles, and cerebro-spinal meningitis.

18. *January*—Bronchitis, gastro-enteritis.

February—Bronchitis, gastro-enteritis.

March—Bronchitis, gastro-enteritis.

April—Gastro-enteritis and bronchitis.

May—Malarial fevers, dysentery.

June—Dysentery, fevers.

July—Dysentery and enteritis.

August—Dysentery and enteritis.

September—Ephemeral fevers, malarial fevers, diphtheria.

October—Diphtheria, ephemeral fevers.

November—Diphtheria, ephemeral fevers.

December—Diphtheria and ephemeral fevers.

19. Epizootic among horses, which commenced about September, grew worse to the middle of November, and then gradually faded away. Quinsy at the same time among hogs, and iritis among horses and cattle to some extent. These diseases came and went with our diphtheria; and I am familiar with the facts that before we had diphtheria in the first family, *their* horses had the epizootic, and hogs the quinsy, prior to and at the time diphtheria broke out with them. Horses had epizootic, and people diphtheria, about Traer, Tama county, much sooner than we had it; and the epizootic was first brought into this neighborhood by men running threshing-machines from those parts in Tama county. I believe that the diphtheria in man, quinsy in hogs, and epizootic in horses, depend on the same or about the same influence and general or common cause.

20. February, wet; July and August, dry; September and October, changeable; November and December, cold. (This question the observers, of whom Prof. Hinrichs, of Iowa City, is at the head, can answer correctly.)

21. July and August were dry; February wet. (Defective.)

22. July and August.

23. February, March, and October.

24. Twenty-two feet.

25. Too obscure to answer. It varies from six feet to twelve and fifteen.

26. February, March, September, October.

27. July and August.

28. See note under question 19.

Yours respectfully,

SAMUEL A. OREN, M. D.

Mount Auburn, Benton County, April 2, 1881.

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*For counties comprising this division, see page 79 and map.

†The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

REPLIES OF N. JASPER JONES, M. D., OF BLAIRSTOWN, BENTON COUNTY.

*1. Incorporated town. Population, 652.

2. Nine.

3. Blairstown and six miles each way therefrom.

4. About the average.

5. Same as No. 4.

6. Cholera infantum, scarlet fever, and measles.

7. Extreme heat for cholera infantum, and infection for scarlet fever and measles.

8. Measles and diphtheria.

9. The dry season, I think, had an influence on diphtheria. There was but one case of measles, which was kept isolated.

10. Cholera infantum and dysentery.

11. Extreme heat.

12. Diphtheria, scarlet fever, measles.

13. Cases were milder.

14. From July to September 15th. Above the average.

15. Scarlet fever, in January; whooping-cough June to December; measles in February and March.

16. (Here I can only give my opinion.) Scarlet fever, about 120 cases, including cases holding on from December, 1879; whooping-cough, about 100 cases; diphtheria, 60 cases, about; nearly everybody had influenza in November or December; measles, one case only.

17. Small-pox, cholera, and cerebro-spinal meningitis.

18. *January*—Scarlet fever and pneumonia.
February—Pneumonia, scarlet fever, measles.
March—Pneumonia, measles.
April—Pneumonia, peritonitis, gastralgia.
May—Pneumonia, cholera morbus.
June—Bilious fevers and whooping-cough.
July — Cholera infantum, whooping-cough, and dysentery.
August—Cholera infantum, whooping-cough, dysentery, pelvic cellulitis.
September — Whooping-cough, dysentery, puerperal insanity, insanity, pelvic cellulitis.
October—Whooping-cough, dysentery, ophthalmia.
November-Pneumonia, whooping-cough, influenza.
December—Pneumonia, influenza, dysentery.

19. Hog cholera during the greater part of the year, affecting one-third to one-half of all the hogs; epizootic affecting all the horses, in November and December.

20. Have no minutes by which I can do so.

21. June, wells dried up; July, August, May, January, March, February, April, September, December, November, October, wells filled to within two feet of ground (top) and cellars overflowed.

22. In June and July.

23. October and November.

24. Twelve to fifteen feet in Blairstown, but in the country, back from the creeks, it is from eighteen to twenty feet.

25. Can only estimate it from my own well. January, 19 feet; February, 18 feet; March, 17½ feet; April, 17 feet; May, 20 feet; June, 23 feet (well dry); July, 21 feet; August, 22 feet; September, 19 feet; October, 2 feet; November, 4 feet; December, 12 feet.

26. October and November.

27. June and July.

28. Measles was brought here by a child having been exposed in Brooklyn, Iowa, to the poison. Whooping-cough was brought in a similar way. Scarlet fever was contracted in the vicinity in 1879, in the usual way.

To conclude: The spread of all contagious and infectious diseases should be controlled by specific legislation, making it a misdemeanor for parents to permit their children to attend school, church, or any public gathering, or even to run on the streets, while said children are affected with any such contagious diseases. Compulsory vaccination and re-vaccination at stated periods would be very apt to root small-pox out of the country. And in case one of these diseases occur, the residence should be marked—say, with a red flag—as a sign of infectious or contagious disease. It should also be a misdemeanor to permit vegetables to remain in the cellars after rotting. School-houses and churches should be declared a nuisance unless well warmed and properly ventilated.

This has been a hard task, and I can but feel it has but poorly been performed. However, I have done my best, and respectfully submit the same. Awaiting your pleasure, I am,

Yours truly, N. JASPER JONES, M. D.

Blairstown, Benton county, March 29, 1881.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

REPLIES OF J. F. ESHER, M. D., OF LOWDEN, CEDAR COUNTY.

*1. The population of our incorporated village, Lowden, is about five hundred and seventy-five.

2. There were only two.

3. The village of Lowden, the south half of Massilon and the whole of Springfield townships, in part of both of which our village is located (all in Cedar county).

4. About the same as in previous years.

5. Ratio of deaths fully fifty per cent less than in previous years.

6. Follicular stomatitis was more than usually prevalent, but in no case coming under my notice did it produce death.

7. Probably the same epidemic influences that made diphtheria so general throughout our State.

8. We have not had any disease particularly prevalent in previous years.

9. ....

10. Probably from pneumonia, and from that there were only two deaths.

11. Infancy and old age.

12. From so few deaths, and being here only a limited time cannot say.

13. ....

14. August, September and part of October; considerable cholera infantum without any deaths, to my knowledge. October and November, follicular stomatitis; some very severe cases, often called diphtheria, but no deaths.

15. Follicular stomatitis October and November.

16. Typhus fever, three; and there were said to be three cases of scarlet fever in our village, yet circumstances lead me to doubt the correctness of the diagnosis. There was, as above stated, an epidemic of follicular stomatitis.

17. Small-pox, scarlet fever(?), cholera, measles, whooping-cough, cerebro-spinal meningitis, diphtheria.

18. *January*—Remittent fever, intermittent fever, pneumonia.
February—Fever and pneumonia.
March—Fever and pectoral trouble.
April—Intermittent and remittent fevers, general exhaustion and rheumatism.
May—Throat trouble, general exhaustion, remittent fever.
June—Same as May.
July—Remittent fevers, stomatitis, diarrhœa.
August—Fevers, remittent and intermittent; cholera-morbus, stomatitis.
September—Cholera-infantum, fevers, stomatitis.
October—Stomatitis, fevers, cholera-infantum.
November—Stomatitis, remittent fever, chest diseases, typhus fever.
December—Fevers, pneumonia, stomatitis.

19. Cerebro-spinal meningitis among horses; some by cholera; and a few cases of pneumonia among the horses. The period at which either of those diseases was most common I cannot say, as it was only incidentally that a knowledge of them was had.

20. January, February and March were mild, with occasional light snows and rains, but on the whole pleasant and dry. April and May were average warm and more than commonly dry. The first part of June was dry, but the last part, together with July and a part of August, were rainy and warm - in fact uncommonly warm. September, warm and first part wet and rainy. October, first part cold and wet, continuing through the most of the month, but latter part dryer and a little more mild, as well as the first ten days of November, after which it froze up with continued cold light snows the remainder of 1880.

21. May, April, January, February, March, November, December, October, September, June, July, August.

22. First three months.

23. June, July and September.

24. From three to eight feet.

25. January, eight; February, eight; March, seven; April, eight; May, eight; June, five; July, August and September, three; October, five; November and December, seven.

26. June, July and August.

27. January, February and March.

28. We have had no communicable diseases, except some three cases of fever of a typhus nature, and they occurred at a farm-house where the drinking water was obtained from the most unfavorable possible locality—a surface slough well in the center of a slough receiving all the drainage from the house, out-house, barn-yard, pig pens—in fact all the refuse matter ever found about a farm.

Respectfully,
J. F. ESCHER, M. D.
Lowden, Cedar county, March 23, 1881.

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* **The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.**

REPLIES OF S. K. KEITH, M. D., OF MECHANICSVILLE, CEDAR COUNTY.

*1. Mechanicsville, 545 inhabitants.

2. Eight.

3. Pioneer and Linn townships, and west half of Fremont township.

4. The same.

5. Greater; about 25 per cent.

6. Whooping-cough, with pneumonic complications.

7. Cannot assign cause.

8. Less; typhoid fever.

9. Offer no opinion.

10. Whooping-cough, complicated with pneumonia.

11. ....

12. Typhoid fever, cases generally of a mild type.

13. ....

14. Deaths from whooping-cough and pneumonia were about 50 per cent greater than usual in the same disease. This was with children under five years of age.

15. April and November; one case in each month of cerebro-spinal meningitis.

16. Small-pox, 0; cholera, 3; scarlet fever (estimated) 25; typhoid fever 6; measles, 0; whooping-cough (estimated) 150; cerebro-spinal meningitis, 2; diphtheria, 15.

17. Small-pox and measles.

18. *January*—Pneumonia and croup.
February—Pneumonia.
March—Pneumonia, rheumatism and diphtheria.
April—Bilious fever, cerebro-spinal meningitis.
May—Intermittent fever.
June—Intermittent fever.
July—Intermittent fever, diarrhœa.
August—Cholera infantum, dysentery.
September—Whooping-cough, typhoid fever.
October—Whooping-cough, autumnal fever.
November—Whooping-cough, scarlet fever and cerebro-spinal meningitis.
December—Whooping-cough, scarlet fever and diphtheria.

19. October, November, and December. Hog disease. Had good opportunity to observe the disease and diagnosed it as *pneumonia*. The cough and respiration were characteristic of pneumonia (physical signs). Postmortem presented the pathological signs, *hepatized lung*. The bowels were constipated.

The disease was prevalent and about one-fourth of the hogs died. Some farmers lost most of their stock, while others lost only a few.

In November the horses had the epizootic in mild form.

My attention has been called more particularly to the swine disease the past season than ever before, because I lost 25 shoats and two old hogs from it. The first symptom of illness was cough; 2d, frequent and labored respiration attended with a noise which the farmers in this vicinity call "*thumps*"; 3d, loss of appetite and great thirst; 4th, emaciation. The bowels in some cases were loose, but a majority were constipated, and the fœcal matter in hard balls (scibula).

From all that I can learn of the swine disease, I conclude we have cholera and pneumonia, and my observations have been on the pneumonic type.

As to the *contagious* character, I say it is *epidemic*.

Poor care and exposure, have much to do with the spread of the disease of the pneumonic type. The almost exclusive corn diet, accounts in part for the choleric type. The digestive organs fail to perfectly digest the food, and the undigested portion is an irritant to the mucous membrane of the bowels, hence the choleric discharge.

I have made no microscopic examination. I directed the man on my farm to make a *post-mortem* examination. He reported hard fœcal matter in the intestines, and lungs shriveled and dark colored."

Had I expected to have been called upon by the State Board of Health, I would have made a careful *post-mortem*. As it is I can only give you the facts as they are observed and as they were reported.

Influence of diet and care. When I had lost 19 shoats out of a lot of 28 in November, 1880, I directed the nine left brought to my barn. Six were sick, and soon died. The remaining three were fed on boiled potatoes with oat and corn meal, mixed with them, and kept in a dry, warm pen, and have continued to thrive to the present time.

No suspected meat has been eaten in this vicinity, hence cannot tell the effect of eating the diseased meat.

As to theory as to cause, or causes of the swine disease, I attribute it

1st. To the too restricted diet of corn.

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* **The figures at the beginning of paragraphs refer to Circular 23B, pages 75–77.**

2d. Too large a number in one lot.

3d. Continuing to keep the hogs in the same lot or pasture without changes.

4th. Keeping too many in the same lot at night to lie on one another.

5th. Poor and wet places to sleep, exposed to wind, rain and sleet.

As a remedy I suggest:

1st. Small lots of hogs together.

2d. More diversified diet, with much less corn.

3d. To run with the cattle in the winter.

4th. Large range in summer, with fresh water.

5th. Dry and protected place to sleep the year round.

20. ....

21. August, July, October, November, September, December, June, January, February. March, April.

22. August and September.

23. May and April.

24. Twenty to twenty-five feet.

25. ....

26. May and April.

27. August and September.

28. Scarlet fever communicated to a school by a pupil.

A mother with two children visited friends in Clarence. Cedar county, where the children were complaining of sore throat. On returning to her home in Fremont, and five days after the exposure, her own children came down with diphtheria.

Yours truly,

SAMUEL KEITH, M. D.

Mechanicsville, Cedar County, March 24, 1881.

REPLIES OF J. B. M'LAUGHLIN, M. D., OF DELMAR, CLINTON COUNTY.

*1. Four hundred and ten.

2. Ten.

3. Delmar and vicinity.

4. Average or perhaps less.

5. Greater, perhaps one-fourth.

6. Diphtheria.

7. ....

8. ....

9. ....

10. Diseases of the lungs.

11. ....

12. ....

13. ....

14. ....

15. ....

16. Three or four cases of scarlet fever, five cases of typhoid fever, one case of measles; all in the city. There were not less than fifty cases of diphtheria in this city and vicinity. I have no way to get the exact number.

17. Small-pox, cholera, whooping-cough, cerebro-spinal meningitis.

18. Diphtheria, October to December, and occasional cases all through the year; pneumonia, December to March; cholera-infantum and cholera-morbus July, August and September.

19. Hog cholera (so-called) prevailed in November and December; quite a number died, perhaps one-fourth as many died of the disease in the year 1879. A great many fowls died during the warm season of the so-called chicken cholera.

20. I cannot find any record of the matter sufficient to give a correct statement.

21. It was very dry in August, May, July and September; but little rain in March. The last of May and first part of June was very wet; the wells were full. Heavy damage was done by the water. (19 and 21 I obtained from the diary of S. S. Norton.)

22. ....

23. ....

24. Depth to water in wells will average about twenty feet.

25. ....

26. ....

27. ....

28. ....

I have made inquiries among the people, and gathered all the information I could on the subjects, and answered all the questions I can in the absence of statistics regularly kept.

Yours, etc.,

J. B. McLAUGHLIN, M. D.

Delmar, Clinton county, May 14, 1881.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

REPLIES OF E. BRENDEL, M. D., OF CEDAR RAPIDS, LINN COUNTY.

As I think, the labors of the Board are to be continued for years to reach the indicated aim; the incoming reports will be sifted and scrutinized in the strictest manner. Hardly anybody will be prepared at present to give full satisfaction. So I suppose you will receive but "frustulæ," which may be of value. During the year one or the other may be interested enough to carry on proper observation, which I promise to do as far as my ability reaches. For the present the following remarks:

The city of Cedar Rapids is located on alluvial sands at an average level of twenty feet above the bedrock of Cedar River, which bedrock is of Devonian age.

Wells sunk are mostly what they call drive-wells, of a pipe length of some fifteen to twenty feet, where the pipe strikes, after passing the surface sand, a bed of clay, slough clay—that is, clay formed by the heavy mineral parts of decayed water plants (mostly silicates and sulphates of aluminin), enclosing twigs and partly decayed wood, remains of insects, etc. This clay is from one to three feet thick. The formation of slough clay is still going on in a slough of an area of about eighty acres, situated west-northwest between the river and the town. Below this clay is found again sand, alternately with perhaps another bed of clay, still the sand (water filter sand, quicksand) is reached at about twenty feet depth, except on some locations where the overlaying sand strata are higher (as for instance near the college building) fifty feet or lower (as on the west side of the river where the water is but twelve to fourteen feet below the surface with a top layer of one to three feet blackish garden soil).

I conclude that the bedrock of the river must be a nearly level stratum inside the city limits. Water found above one, or between the layers of clay, is usually unhealthy (miasmatic) like the slough water above mentioned in the neighborhood of which intermittent fevers are prevailing. But as such wells are found nearly all over the town the character of the intermittent or remittent is stamped on most any disease, one may say, throughout the year; even in winter the catarrhal and inflammatory diseases of the respiratory organs are stained with it.

As a rule in spring time the miasmatic diseases affect the respiratory and alimentary canals equally, but the affection is milder and of a shorter duration than in autumn.

The probable cause of it is, that products of decay of the winter accumulation of garbage is faster used up by the growth of the new vegetation and occasional rain, than in autumn when, especially after a dry summer. this garbage, together with the withering of plants by the general involution of the season produces copious miasmas (in our alleys). The alimentary apparatus is then mostly interested.

As I have not kept a journal the last year, and do not like to produce the notes of others respecting question 16, I must refer to Dr. H. Ristine, who I think kept a record of diseases occurring in his large practice.

Respecting schools I may first but mention that the heating of school-houses in winter admits a good deal of pious wishes touching the equal distribution of temperature in the rooms. The furnace heating seems to have not reached a perfectness. But for that I think an architect could furnish a better criticism.

Strict rules should be given to be observed by the teachers in regard to the timely attention of children to the necessary functions of relief to prevent as much as possible undue disturbances during school hours. But no child should be kept in the room (as it is very often the case, if not the rule with some teachers) whenever necessity demands to let the child go out. That is all well known to everybody, still it is needful to bring it to recollection.

The method of writing on the desk is here rather abnormal. At least I did not notice the like in Illinois schools. It is this: the child sits sideways, with the forearm on the desk, pushing the shoulder upward while the other shoulder hangs down so far as to rest the elbow on the thigh. In case children have to write for a long time and acquire the habit of such a posture for the rest of their lives, perhaps make writing their business, the weight of about one-sixth of their body supported by the ligaments of the shoulder joint, and the teres muscles, will finally produce subluxation of the humerus upwards. the partial relaxation of the trapezius, levator anguli, rhomboideus on the scapula, the sternocleidomastoid —in short the whole set of muscles—keeping the scapula and clavicle up and backwards relaxed, the pectoral and deltoid strained, act as a lever to lift the scapula far outward and backward. The spine curved sideways, and the muscles of one side of the neck relaxed, the neck bent to the opposite side. hinder the circulation and the expansion of the chest. It is clear that such a posture will, in the end, cripple the best constituted body, injuring spine and lungs. But what may be the cause for such a most ungracious, lazy looking attitude, methodically carried out? Some excuse could be furnished by the narrowness and lowness of the seats, which are made for small children, not for lanky boys and girls of 4.75 feet high, if such an deculpation is admissable.

I am, sir, very respectfully,

Yours truly,

E. BRENDEL, M. D.

Cedar Rapids, Linn county, March 31, 1881.

DIPHTHERIA IN WAUBEEK, LINN COUNTY, AND VICINITY—REPORTED BY WARD WOODBRIDGE, M. D., HEALTH PHYSICIAN OF WAUBEEK.

Diphtheria is prevailing in the village of Waubeek and vicinity, now, for the fourth time in two years and three months. In August, 1879, it made its first appearance in twenty years, and at that time the first case appeared in a family out of town. There was no school, and as far as could be told the case was one of spontaneous development. It proved fatal, and all the other members of the family, including the mother, the father being at that time in the Black Hills, were attacked with it, but all recovering. At the same time, a serious epidemic was prevailing in Cedar Rapids, and the next two cases were undoubtedly imported from there, both proving fatal. There were a few light cases following, and it declined. The people knew nothing at all of it, and sympathizing with their neighbors visited them, and public funerals were held. Proper cautions were not taken in cleansing, etc., and in December following another and more severe epidemic broke out, resulting in fourteen deaths. Two physicians, Drs. Crawford and Gremm, were here at the time, and battled manfully with the disease, Crawford being an able young man, Gremm an "irregular." At the time this epidemic prevailed, I was away at school and no record was kept of it. So my facts have to be gathered from any and every source available; but there was no importation in the beginning of the second epidemic. There were a few unimportant cases following in the fall and winter of 1880 and 1881. In April, 1881, I settled in Waubeek, in Dr. Crawford's place, Dr. Gremm having previously moved away. June 14th, on returning home from the meeting of the Iowa Union Medical Society, I was summoned to see a child fourteen years of age, and found him suffering from a very severe attack of diphtheria. This case occurred at school, as did, also, the first case of the second epidemic referred to above. My first case was in the family of a merchant of the town, and both he and his wife came down into the store from the sick room (living over the store), and I am told that the mother of the next case was in the store with her two children, aged aged two and one-half years, and eight months, respectively; and that the lady took the children in her arms. This she denies to me, so I give it for what it is worth, which is not much, as we shall see presently The first case made a good recovery, but the next two were fatal, one dying of diphtheritic laryngitis. From this, the disease spread, and seven cases proved fatal in the village and five around it. Some rather remarkable evidence of its contagiousness may as well be spoken of here. A little girl, aged about ten years, had some relatives living in town, and she came to stay all night with them. In the night one of the children was taken sick with diphtheria. She returned home, went to school, and in five days took sick at school. Six days following, two cases occurred in two separate families, and soon two more, all proving fatal. The little girl first taken made a slow, tedious recovery. A baby in the same family died with it. There were forty-one cases in all. The disease gradually declined, and in six weeks had entirely disappeared. During its prevalence, I tried to impress on the people the necessity of using great caution. No public funerals were allowed, and everything used about the sick burned or thoroughly smoked with sulphur fumes and then washed. October 8th I was again called to see a case, which took sick at school. On returning home, I sent my own children at once to their grand-parents, to isolate them from it if possible, but on the evening of the 7th my girl, aged eight, was taken sick with it, and died the morning of the 10th, and to-night, as I pen these lines, I am watching over another one of my children lying very sick with it. There have been, so far, thirteen cases, with three deaths, and it is still raging. This makes fifty-four cases which have been in my hands since the 14th of June, with fifteen deaths. Now this epidemic has not by any means been confined to Waubeek and vicinity, but has been all around us, both in towns and country.

The village of Waubeek is situated on the southwest bank of the Wapsipinicon River, Maine township, Linn county, Iowa, and contains about three hundred inhabitants. The ground is lower than it is west and northwest, but on a level south and southeast. It is located on a ledge of rocks, which in places crop out, and there are several fine rock quarries in and around it. There is a fine farming country all around the village, except to the east, and a community of good, intelligent farmers. There is a good water privilege and a mill; a creamery in almost the center of the town, to which I shall have occasion to refer again. It is not, strictly speaking, a thrifty village. While there are a great many industrious people, there are, also, a great many who seem to live from hand to mouth; and some rather untidy housekeepers, which, of course, is very inviting to contagious and infectious diseases. Malaria enters largely into all forms of sickness throughout the community, either primarily or as a complication. In very many of the cases of diphtheria I have noted the intermittent character of the fever, and often more than the initial chill, with gastric irritation, showing distinctly, it seems to me, that malaria is adding to the severity of the disease. The health of the community in general, this year, has been at a very low standard—or, in other words, "below par." Neuralgia, rheumatism, gastric catarrh, malarial and typhus-malarial fevers. Erysipelas sores not healing kindly, but persistent and stubborn, have been prevailing to a much more than usual extent for the past six months. Scarlet fever has also prevailed about eight miles south of us, to some extent.

We refer to the well-known physical law, "That no effect can be the result of a single cause," and so I fully believe in regard to diphtheria—that no single cause for it will ever be demonstrated; but, rather, that a multiplicity of causes will always be found operating for its production. I do not refer to the specific character of the disease; for that, of course, is well defined, but to the causes operating to bring on an epidemic. I see the United States Board of Health agree that it is at first a strictly local disease. With the greatest respect for the opinions of those very able gentlemen, I am not prepared to agree with them. On the other hand are very able and experienced investigators who maintain that it is *always* primarily a constitutional disease, with a local manifestation. This I also deny. I think the "golden mean" is to be found between the two extreme opinions; viz., that a great number of cases are primarily constitutional, and the throat symptoms secondary. Others, again, manifest very mild throat symptoms, with little or no constitutional disturbance. Very often I have seen cases start out with the gravest constitutional disturbance; intense fevers, reaching 105° F., pulse 140°, or even higher, with great prostration, aching head, back and limbs, and profound disturbance of the nervous system, with the throat symptoms entirely in abeyance for twenty-four or thirty-six hours, and the cases proceed rapidly to a fatal termination. This, it seems to me, could be accounted for in no other way than that the diphtheretic virus had invaded the whole economy, and that the onset of the disease was so violent as to be incompatible with life. I remember one case very distinctly, of this kind, in which the membrane on the tonsils never exceeded the size of the thumb nail, yet it was fatal. Perhaps it is unwise to occupy space in arguing this point further, and is of no use for me to attempt to speak of the specific character of the virus—to tell what it is, or what it is not. Volumes have already been written upon it. The question is: Why does it prevail so often, persistently and fatally about Waubeek? First, the influence of contagion must be admitted. We cannot, of course, tell the manner of its operation. Can we even say that it is capable of being widely diffused? It seems to hang around certain places and things, in a manner perfectly surprising. I have said that it was not confined to Waubeek and its vicinity. It is prevailing now in and about Anamosa, twelve miles distant; in and about Springville, eight miles distant; and in the country eight miles west and northwest; also, to some extent, in Marion and Cedar Rapids, but not to the extent that it has in our vicinity. It was in Cedar Rapids before it appeared in Waubeek. There are no swamps near our village; no new land being broken up; but all under a high state of cultivation. The creamery spoken of above, was not kept in the best possible condition. There was a cistern to receive the sour milk, which was allowed to go foul. The owners were requested to clean it out, and wash it with copperas water once a week, which they very kindly did. The mill-dam was injured during the high water in the spring, and a new water-course cut its way through and left the old bed lying next the town, with some stagnant water in it. The mill company repaired it, and it is now full of water, removing that possible source of infection. Nearly all the drinking water is from wells drilled from forty to sixty feet in the solid rock. Indeed, I cannot see that there is anything in the village, or its surroundings, that specially invites the contagious germ of diphtheria, that they do not have in all the towns and villages about us, and so they have diphtheria too. It certainly was not carried from Waubeek to them. So, there must be a multiplicity of causes, with health generally at a low ebb.

The prevalence of disease of all kinds, and especially of an infectious character—for even typhoid fever has been prevailing southwest of us to an alarming extent—will show the causes can hardly be atmospheric, as it will break out, and run four or six weeks, then decline, and nothing more be heard of it for a longer or shorter interval, when it will break out again. Moreover, an epidemic will be declining in one place, at its height in another, and commencing in another. So, it would seem that whatever the circumstances are that so favor its development and progress, they could not bring it about without the presence of its own peculiar contagious germ. (Some gentlemen may object to the term, germ; they may call it something else.) So epidemic and contagion could hardly be separated. There are isolated cases occurring all the time. Sporadically—sometimes one; sometimes a few in a place. Only last week a girl fifteen years old died with it, and no case had been within five miles of the locality for three months, they living in the country, several miles from all towns. Thus, after all, we are obliged to say that the diphtheretic germ is present with us, and that occasionally an assemblage of circumstances favor its development, and that the nature of both are unknown to us. In its nature it is worse than scarlet fever, for it is sporadic, epidemic, and contagious; and there seems no possible escape from it. I am often asked, as I presume all physicians are: "Is there no preventive?" My invariable reply is: only, to get the general health up to as high a standard as possible, so that in case an attack should come, perhaps it may lighten it. It is a terrible scourge, snatching away the youth, beauty and promise of our land, and the disease is assuming alarming magnitude, not only with us, here in this vicinity, but all over the country, and in fact the world. There have been, in the two years and three months, twenty-nine deaths in and around Waubeek, and doubtless as many more in a radius of ten miles. It will be a happy time for the human family when the profession find some plan of treatment that will more nearly control it than any now known; but at present there is a large class of cases, and doubtless always will be, that the medical arm is too short to reach; for when we reach the point when science is equal to disease, death will be banished from the land—a point inconsistent with nature, and never designed by "Him who doeth all things well."

Respectfully and fraternally yours,

WARD WOODBRIDGE, M. D.

Waubeek, Linn county, October 24, 1881.

REPLIES OF J. S. WATTS, M. D., OF MILLERSBURG, IOWA COUNTY.

*1. Not incorporated.

3. Two-thirds of English township; three-fourths of Dayton township; most of Pilot township; one-half of Lincoln township; all in Iowa county.

4. Less. Perhaps an average amount including the whole year, but less during greater part of it.

5. Perhaps as many or more deaths than the average.

6. Dysentery. In children under two years it was accompanied with gastric trouble resembling therein cholera infantum, and was fatal in from three to five days.

8. Notably typhoid fever, which occurred in but one family in the country. In the village of Millersburg there were more cases than usual. It originated in a family living almost constantly in a single low room, with the surroundings all bad, such as water under the house, filth on the outside. But one or two other persons had it, and it was clearly traceable to the one family. This town is usually exempt from it.

10. In the early part of year there were three or four deaths from pneumonia in adults. All were women. This is unusual here.

12. Typhoid fever.

13. Fewer cases than most years.

14. From July 15th to August 15th. Dysentery.

16. Scarlet fever; perhaps ten or twelve. Typhoid fever, twelve. I think diptheria was not prevalent. A few sporadic cases, but no fatality. Cannot give the number.

17. Small-pox, cerebro-spinal meningitis. Do not remember either measles or whooping-cough, but am not positive that no case occurred, but think not.

18. Cannot answer.

19. So called hog cholera.

To many of your questions cannot give a definite answer. In general way am only able to say the summer and fall were both dry. Water is usually found from fifteen to twenty feet below the surface. Last fall it was nearly twice as far. If you are not able from other reports to approximate the truth in regard to meteorological conditions, I will endeavor to answer any special questions you may ask.

Yours, etc.,

J. S. WATTS, M. D.

Millersburg, Iowa county, April 29, 1881.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

SOUTHEASTERN DIVISION.†

REPLIES OF W. S. ROBERTSON, M. D., OF MUSCATINE.

*1. Incorporated city of 8,294.

2. ....

3. The city of Muscatine, Iowa, and suburbs proper.

4. Probably greater; increased by epidemic scarlet fever.

5. Probably greater, from scarlet fever epidemic.

6. Scarlet fever.

7. Carelessness of the lower classes in not permitting proper isolation and quarantine.

8. Malarial diseases and typhoid fever.

9. High water carrying off unhealthy matters after it was too late to generate miasms.

10. Scarlet fever.

11. Answered in No. 7.

12. Answered by No. 9.

13. Answered by No. 9.

14. During autumn; rather above average

16. Probably 150 scarlet fever; five small-pox; sporadic cholera, twenty; diptheria, *true*, ten; typhoid fever, unknown; measles, mild epidemic; whooping-cough, mildly epidemic; cerebro-spinal meningitis, three or four cases; chicken-pox, epidemic, mildly; a few cases of winter cholera up to Dec. 31st.

17. ......

18. Not presumed to be in order of greatest prevalence. Malarial diseases, one; pneumonia, six; scarlet fever, two; dysentery, seven; small-pox, eight; diseases of childhood, three; erysipelas, eight; measles, four; whooping-cough, five; puerperal diseases, nine.

19. ....

20. ....

21. .. ..

22. ....

23. ....

24. Twenty-five to sixty feet.

25. Don't know.

26. June and July.

27. Autumn.

Wishing to say something, I make the supposed approximation timidly; to be sure it is but an approximation. Address J. P. Walton, Muscatine, who will tell you all about everything below No. 20.

W. S. Robertson, M. D.

Muscatine, Muscatine county.

REPLIES OF J. P. WALTON, OF MUSCATINE.

In reply to your Circular No. 23B, I will answer:

20. *January*—Warm and muddy all the month.

February—Warm and muddy all the month.

March — Warm and muddy all the month.

April—First half dry, last half showery.

May—First half dry, last half showery.

June—Wet for nine days after the 14th day; the remainder of the month showery.

July—Dry from the 8th to the 18th; the remainder showery.

August—Dry to the 17th; wet the last half of the month.

September—Dry to the 15th; wet the last half of the month.

October—Dry all the month.

November—Cold and dry; light snow squalls.

December—Cold and dry; light snow squalls.

21. The months of October, November, and December.

22. The months of October, November, and December.

23. January, February, March, June, and half of August.

24. Our city is very uneven; in the valleys, from ten to twenty feet. On the hill from twenty to thirty feet.

25. There is but little difference in winter or summer. The water is held by stratas of hard pan (hard clay). Dry seasons affect the quantity, and not the depth materially.

27-28. Answered by 25.

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*The figures beginning paragraphs refer to Circular 23B, on pages 75-77.

†For counties comprising this division, see page 79 and map.

I have ventured to send a table showing the different means for thirty years, and the mean for the different months of 1880, which you can compare at a glance. I think the number of days that snow or rain fell the best test to tell the moisture of the ground. Hard rains generally run off without making the ground excessively wet; the light continuous rains wet the most. As excessive cold or hot months have most to do with the health, I have ventured a column on the temperature.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
The average fall of rain and melted snow in inches...	1.52	2.21	2.78	3.79	4.95	4.59	4.68	5.69	4.29	3.65	3.27	2.34	44.27
Rain and melted snow 1880 in inches	3.02	1.63	3.36	3.02	3.25	7.22	3.84	4.46	3.71	.25	.97	1.31	36.44
The average number of rainy or snowy days for 30 years	6	7	8	8	10	8½	8½	7½	8	7	8	7	77
Rainy or snowy days of 1880	10	4	9	7	6	12	7	12	7	4	8	8	94
Wet and dry months of 1880	wet	...	wet	...	...	wet	...	less ½ wet	...	dry	dry	dry	
Mean thermometer for 30 years. degrees	20.9	24.7	31.1	48.7	51.8	66.9	72.3	70.2	62.2	49.2	36.7	23.7	
Mean thermometer for 1880, degrees	35.1	32.0	35.1	48.0	65.1	71.0	76.1	72.0	60.6	48.4	27.4	18.6	

J. P. WALTON.

Muscatine, Muscatine county, April 5, 1881.

REPLIES OF H. M. DEAN, OF MUSCATINE, MUSCATINE COUNTY.

*1. About 8,294.

2. About two hundred.

3. City and township of Muscatine.

4. About the average.

5. About the average.

6. Scarlet fever deaths about seventy, and small-pox deaths none. There had been none of either for some fifteen years or more.

7. Cannot.

8. Malarial fevers were less fatal.

9. We had a very high stage of water in rivers late in the season (should think in July) and afterward dry weather. The high water carried away a great deal of filth.

10. Scarlet fever and small-pox.

11. Cannot.

12. Malarial fever.

13. Same as number nine.

14. Scarlet fever during the fall and winter months; rate was high.

15. Scarlet fever was prevalent the whole of the year. Small-pox was brought here in December, 1880; but on reflection I find that no case of death from small-pox occurred in 1880.

16. Small-pox, two; cholera, there may have been a few sporadic cases; scarlet fever, probably two hundred; typhoid fever, a few; measles, probably fifty; whooping-cough, quite a number; cerebro-spinal meningitis, no very well marked cases; diphtheria, no genuine cases.

17. I do not think there was a case of genuine diphtheria.

18. Cannot.

19. There was no serious disease among animals.

20. Cannot.

21. From January 1st the winter months were dry. The spring months were rainy, but not as much as usual; the remainder of the season was dry. Cannot give the condition of each month. Mr. J. P. Walton keeps a record for the Smithsonian Institute, and doubtless would furnish information of the character required, if requested to do so.

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*The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

22. It was unusually dry from July 1st to December 31st; cannot specify more definitely.

23. During no month.

24. Average depth about twelve feet. But during the wet seasons the water is only a few feet from the surface over quite a large portion of the city, and many of the cellars have water in them from one inch to two feet deep.

25. Cannot tell.

26. Do not recollect, if any.

27. October, November and December were lower than usual, but not as low as at some other times.

Very truly yours,

H. M. Dean, M. D.

Muscatine, Muscatine county, March 24, 1881.

REPLIES OF FRED. H. LITTLE, M. D., OF MUSCATINE.

*1. The population is 8.294.

2. Can't tell positively, as no statistics were kept before June 1st, 1880.

3. The city of Muscatine.

4. The sickness was somewhat less, owing to lessened amount of malaria.

5. The ratio of deaths was about the same, I think. as of previous years.

6. Scarlet fever.

7. Cannot.

8. Malarial fevers.

9. The lessened amount of malarial poison.

10. Scarlet fever.

11. More malignant cases of scarlet fever than usual.

12. Malarial fevers.

13. The fevers were less intense, and the dry hot weather of the summer was favorable.

14. Scarlet fever began about June 1st, 1880. with an unusually high rate of mortality.

15. Scarlet fever about June 1st, 1880.

16. Small-pox, none; cholera, do not know, but I think but few; scarlet fever, June 1st to December 31st, 1880, eighty-one cases; measles, none; whooping-cough, probably not more than five or six cases; cerebro-spinal meningitis, none; diphtheria, none.

17. Small-pox, diphtheria, measles, cerebro-spinal meningitis.

18. Can't do it for want of evidence.

19. No diseases manifested themselves among animals during 1880, except epizootic among horses, which was very light. and there were no fatal cases. It appeared in November.

The questions in regard to meteorology will be answered by another correspondent at this place.

Very respectfully,

F. H. Little, M. D.

Muscatine, Muscatine county.

REPLIES OF G. F. GEISE, M. D., OF MIDDLETOWN, DES MOINES COUNTY.

To give a complete answer to all your questions requires what few practitioners keep, an account. However, I will go over them and see what I can do.

*1. Town not incorporated; population about 116.

2. Five.

3. My practice is principally in Danville, Flint River, and Augusta townships.

4. Rather a greater amount of sickness than usual.

5. Increased by several fold.

6. Chronic diseases principally of long standing in old people.

7. Have no cause.

8. ....

9. ....

10. Chronic consumption, rheumatism.

14. It seemed that all weak were manifested last year.

15. None.

16. Scarlet fever prevailed all the year; a few cases of typhoid; a few cases of measles and diphtheria.

17. Small-pox, cholera. There was small-pox at Burlington, nine miles from here.

21. The summer was dry after about June.

22. August and September.

23. Not at any time.

24. Vary greatly; between ten and thirty feet.

25-26. At no time.

27. August to February, 1881.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

Our butcher, J. P. Wing, has not cleaned his slaughter-house this winter. He is rendering diseased animals, principally hogs, in a tank situated in the township east of this. These animals sometimes lay until they become very rotten. He is extremely careless and filthy. Sometimes after working with these hogs he does not even wash his hands to eat. Butchers with the same instruments that he cuts up hogs with without washing them. Has now a pile of these dead hogs, about 2,000 pounds, cut to pieces ready for the tank, laying uncovered in Middletown. What shall we do? We have been trying to get the trustees of this (Danville) township to organize into a board of health and take care of it, but one of the members, Mr. J. A. Green, is a friend to Wing, so he will do nothing. Wing has, by some means, gained the support of another (Mr. Mathews) which gives *him* the majority and *us* to stand the stink. We reported him to the grand jury, but he had two good friends there who had it all " cut and dried " to work his case through for him, and succeeded.

So here we are, no better off. Last year he had hogs laying out nearly all summer, which came near stinking us out of health and home.. The probability is that it will be no better this summer.

I do not know that this belongs to my answer as a correspondent, but thought I would try it as briefly as possible. This is only a fraction of it when all told.

Very truly yours,

GEO. F. GIESE, M. D.

Middletown, Des Moines county, March 28, 1881.

REPLIES OF L. B. POWER, M. D., OF MEDIAPOLIS, DES MOINES COUNTY.

*1. Incorporated town; population, 423.

2. About (4) four.

3. From this point east thirteen miles to Mississippi River; west, north, and south, about six miles.

4. Increase of nearly one-half.

5. Increase of nearly one-half.

6. Phthisis and pneumonia.

There was a marked increase in the prevalence of typhoid fever, typho malarial fever, and typhoid pneumonia on the bottoms, occasioned by the floods of the early summer.

8-9-10. Dropsy in its various forms.

11. None can be given that would satisfactorily account for it.

12. ....

13. ....

14. From February 10th to April 30th there was an unusual fatality attending typhoid pneumonia and the mortality rate was unusually high.

15. During December small-pox prevailed to some extent.

16. Small-pox, three; scarlet fever, probably twenty-five; typhoid fever, five; measles, probably fifty; whooping-cough, probably fifty; diphtheria, probably 100. There was some varicella, but not amounting to an epidemic.

17. Cholera and cerebro-spinal meningitis

18. *January, February, March, and April*—Pneumonia, inflammatory rheumatism, and scarlet fever.

May, June, July, and August—Principally the intermittents and remittents.

Typhoid and typho malarial fever, with some scarlet fever and diptheria.

December—Diphtheria, scarlet fever, measles, and rheumatism.

19. During the fall and entire winter epizootic and distemper largely prevailed.

20. Not having noticed particularly, I do not think generalities of sufficient reliability to record.

21. January, February, March, April, and May were not; the remainder of the year, up to the snow-fall, the last of November, was very dry. Last of November and December unusual snowfall.

22. June, July, August, September, and October.

23. No unusual moisture of soil.

24. On the prairies about ten feet; near the Mississippi River about twenty-five feet, owing to the descent of the bluffs toward the river-bottom.

25. During the fall months average from three to six feet lower.

26. Not at all.

27. August, September and October.

28. There was, as stated, no peculiar phases of disease, or its increase, except upon the river-bottoms where, owing to the overflow, the destruction of vegetation, and the large amount of animal matter left to decay, together with the

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*The figures at the beginning of paragraphs refers to Circular 23B, on pages 75-77.

vitiated water in the wells which in that locality produced an unusual amount of typhoid and typho-malarial fever, but strangely there was not near the usual amount of intermittent fever during the year.

September, October, and November—

L. B. Power, M. D.

Mediapolis, Des Moines county, May 1, 1881.

REPLIES OF R. SMITH, M. D., MEDIAPOLIS, DES MOINES COUNTY.

1. Four hundred and twenty-three.
2. Five.
3. For the incorporated town of Mediapolis, Des Moines county, Iowa.
4. I think the amount of sickness greater.
5. Greater; 2 or 3.
6. Typhoid fever, scarlet fever.
7. Do not know of any cause.
8. Diphtheria, cholera infantum, measles.
9. Know of no cause from present recollection; we had an abundance of fever.
10. Deaths were from no prevailing disease.
11. No cause nor unusual mortality.
12. Scarlet fever.
13. To the mildness of its character.
14. No answer.
15. No answer.
17. Scarlet fever, 5 cases, typhoid fever, 3 cases; whooping-cough, 10 cases; cholera, small-pox, measles, cerebro-spinal meningits.
18. *November*—Scarlet fever.
August—Typhoid fever.
November—Whooping-cough, diphtheria.
19. No answer.
20. ....
21. ....
22. ....
23. ....
24 Usual average depth of well not over 12 feet.
25. Did not measure a well.
26. ....
27. September.
28. ....

Respectfully,

R. Smith, M. D.

Mediapolis, Des Moines county, March 25, 1881.

REPLIES OF A. E. PARKER. M. D., OF KOSSUTH, DES MOINES COUNTY.

1. Yellow springs, 2,094; Huron, 865; Benton, 1,271.
2. ....
3. Towns of Yellow Springs, Huron and Benton.
4. Greater; 50 per cent.
5. Greater.
6. Scarlatina and pneumonia.
7. Location in above towns of eight "new doctors," mostly "irregulars," who generally, at first, pronounced scarlatina "scarlet-rash," and non-contagious. The excess of deaths from pneumonia were from neglect to stimulate, depletion instead of nutrition.
8. Typhoid fever and diphtheria.
9. Unknown.
10. Scarlatina and pneumonia.
11. Already answered; neglect and bad treatment.
12. Typhoid fever and diphtheria.
13. Diphtheria, mild winter; typhoid fever unknown.
14. Scarlatina from September 20, 1879 to April 15, 1880.
15. Nothing new.
16. Cannot tell.
17. Small-pox, cholera, cerebro-spinal meningitis.
18. Have no list.
19. Hog cholera, less than common.
20. Storms of all kinds less in 1st part of year.
21. Whole year dry. The least moisture in 9th, 10th, 11th, 8th, 7th, 6th, 5th, 4th, 3d, 2d, 1st, 12th months.
23. Dry, dry, dry
24. From 20 feet to 60 feet.
25. In dry months from 5 to 10 feet deeper.
26. Did not note any difference.
27. 7th, 8th, 9th, 10th, 11th, 12th.
28. Can only spare time to number statements in regard to scarlatina, in which the contagion is wholly due to the epithelial designation or, rather the

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*The figures beginning each paragraph refer to the questions in Circular 23B, on pages 75-77.

inhalation thereof. Proof: In 11 families of from 3 to 8 children, there was only one case of scarlatina in each family. In all these, baths and inunction were used throughout. In families where the inunctions were omitted all the children and often the parents were infected.

Yours, etc.

A. E. Parker, M. D.

Kossuth, Des Moines county, April 29, 1881.

REPLIES FROM C. H. PRESTON, M. D., OF DAVENPORT.

1. Twenty-one thousand eight hundred and twenty-four.
2. Reported by undertaker, 347.
3. City of Davenport.
4. About the same.
5. One thousand five hundred and seventy-seven; average about 16 per 1,000.
6. Scarlet fever and diphtheria.
7. Know of none.
8. Cannot state.
9. Cannot state.
10. Same as No. 6.
11. More than usual prevalence.
12. Cannot state.
13. Cannot state.
14. Greatest mortality from scarlet fever, 11 in June; diphtheria, 7 in September.
15. ....
16. For the first ten months of 1880, scarlet fever, 30; typhoid fever, 5; measles, 2; whooping-cough, 11; diphtheria, 27. No reported record for November and December, the total mortality for which was 66.
17. Small-pox, cholera and cerebro-spinal meningitis.
18. Report except for November and December, furnished by Dr. Cantwell of the local board.

[The report of Dr. Cantwell gives the following:—Secretary.]

July—Diphtheria, 1; scarlet fever, 4.

August—Diphtheria, 9; scarlet fever, 27; typhoid fever, 1; whooping-cough, 2.

September—Diphtheria, 7; scarlet fever, 38; typhoid fever, 1.

October—Diphtheria 9; scarlet fever, 9.

19. A very fatal eruptive disease destroyed a large per centage of the domestic cats of the city and county during the summer and autumn.

20. I give a monthly summary of meterological conditions kindly furnished by the Signal Service Observer, Mr. McGauran.

METEOROLOGICAL NOTES, DAVENPORT, IOWA, 1880.

January—Remarkable high temperature. The mean being 17° above the average for January in seven previous years. The highest barometer occurred on the day succeeding the lowest.

February — Temperature, like that of January, above normal. Almost total absence of even great range of barometer.

March—(Very dry up to the 25th. Precipitation less than 0.1 in.). After the 25th copious rains. Remarkably low barometer on the 27th.

April—Very windy. Frequent thunderstorms and violent gales. Local rain-fall in excess

May—Average temperature decidedly higher than recorded for any in the last ten years; greater part of the month dry, but total rain-fall normal.

June—Abnormally large rain-fall, nearly half of which fell in six hours. Temperature above the average for June. River unusually high.

July — Temperature 1 degree below normal. Rain-fall average, but less than in July, 1879.

August—First half of month very dry, last nine days rainy. Temperature and rain-fall above normal.

September—Rain fall in excess. Average temperature nearly 3 degrees higher than in 1879.

October—Very dry after the 3d. Temperature normal, though 2½ degrees lower than in October, 1879; first frost of the season on the 4th; great gale and first snow on the 16th.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

November—Remarkably high barometer and low temperature after the 10th. Deficiency in rain-fall. River closed on the 22d.

December—Temperature below normal. Last half of month remarkably cloudy, there being eight days in succession on which the sun was not seen.

M. McGauran, *S. S. Obs.*

Davenport, Scott county.

21. February, March, May, August, October and November for the most part dry; April, June, and September, wet. The soil moisture varied to correspond.

22. Cannot say.

23. Cannot say.

24. About fifteen feet below the bluffs; thirty or forty feet above the bluffs.

25, 26, 27, 28, cannot say.

H. C. Preston, M. D.

REPLIES OF L. J. ROGERS, M. D., OF SALEM, HENRY COUNTY.

*1. Number of inhabitants, five hundred and twenty-four.

2. Number four.

3. About three miles square.

4. About an average.

5. The ratio of death very small—probably one-half less.

6. None.

8. Typhoid.

9. Less malaria.

10. None.

11. No report.

12. 13, 14. September much less; much less; water and atmosphere pure.

15. None; small-pox, none; cholera, none; scarlet fever, six; typhoid, about six; measles, quite a number; whooping-cough, none; cerebro-spinal meningitis, none; diphtheria, probably twelve.

17. They are mentioned above.

18. *September*, malarial fever.
February and March, pneumonia.
April, measles.
October and November, typhoid.

19. Epizootic in horses in *April and May* quite extensively.

20. In *January*, no zero; lowest 16° above, highest 56°; four days' rain; snow one-fourth inch 21st. *February*, 4° above; 4th and 29th, 66° above. *March*, highest thermometer 70°, lowest 4°; rain 25th, 26th, 27th and 31st. *April*, highest thermometer 84°, lowest 26°; rain 15th, 16th, 23d, hail 24th. *May* highest thermometer 92°, lowest 80°; rain 16th, 25th, 26th, 27th, 28th, 29th and 30th. *June*, highest 94°, lowest 90°; rain 4th, 5th, 9th, 13th, 14th, 24th, 26th and 27th. *July*, highest 94°, lowest 90°; rain 2d, 8th, 25th and 31st. *August*, highest 100°, lowest 90°; rain 17th, 24th, 25th, 28th and 29th. *September*, highest 90°, lowest 38°; rain 2d, 15th and 19th, frost 13th. *October* 17th, thermometer 20° above; rain 2d, snow 16th and 18th. *November*, highest thermometer 21°, lowest 2° above; rain 2d and 10th, snow 15th, 24th and 29th. *December*, zero 5th, 7th and 8th; highest 14° above.

21. The above will clearly answer the question.

22. October and November.

23. May and June.

24. About sixteen feet.

25. Not having noted these facts, don't know.

26. May and June.

27. October and November.

28. The probable cause of disease, more than any other, is no doubt in the drainage leading to wells, bad water, dirty or filthy cellars, dish and wash water poured out at the door. I had an interesting case. Mrs. O., aged 44, had chronic diarrhœa, and, finally, nearly all the family; then the neighbors, who came to care for the sick. Tracing out the cause, a leak was found in the well near the top of the water, through which came into the well a thick, black, dirty stream, which impregnated the water. I had the well cleaned, and my patients soon recovered. Up to the time of the cleaning, no medicine seemed to avail anything.

Respectfully,

L. J. Rogers, M. D.

Salem, Henry county, May 2, 1881.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, on pages 75-77.

NORTHERN DIVISION.*

REPLIES OF C. C. HUCKINS, M. D., OF GREENE, BUTLER COUNTY.

†1. Incorporated town; number of inhabitants seven hundred and eleven.

2. About twenty, not over; under that number, if any different.

3. A radius of six miles, with this town as the center.

4. The amount of sickness was less during the year 1880 than the average for the past six years.

5. The ratio of deaths was perhaps less than that of other years.

6. Malarial diseases were rather more prevalent than usual. No unusual cause of death can be mentioned.

7. Drought is the only cause that I can mention.

8. Contagious diseases were less than usually present.

9. The education of the people in the way of avoiding such: to quarantine and thorough disinfection after cases of such diseases.

10. ....

11. ....

12. Malarial diseases particularly.

13. Probably the type.

14. Moderate epidemic of diphtheria, March and April; mortality probably less than usual.

15. ....

16. Small-pox, none; cholera, none; scarlet fever, none; typhoid fever, not over half dozen; measles, twenty-five or thirty; whooping-cough, a few, not very prevalent; cerebro-spinal meningitis, none; diphtheria, perhaps twelve to fifteen. None other diseases of their nature that I am aware of.

17. Small-pox, cholera, scarlet fever, cerebro-spinal meningitis.

18. *March and April*, diphtheria.
August, typhoid fever.
May, scarlet fever.

19. I cannot specify months. During the fall of 1880, cholera among hogs. In the spring, mild epidemic of pneumonia among horses, not contagious. Chicken cholera at different times during the year.

20. January, light snow-fall; little rain: moderately cold. March and April, cold; rather dry. Summer months, hot and dry. October, November and December, cold, with heavy snow-fall. The year dry throughout, with less than usual thunder-storms. No continued storms. Winds moderate throughout the year.

21. See answer to 20.

22, 23. Cannot state with any correctness.

24. Impossible to give an average, as the depth is uneven; but it varies from fifteen to one hundred and twenty-five; forty-five feet is quite common, one hundred quite rare.

25. Can't answer.

26. Had no unusually high water during the year.

27. From July to September water was unusually low in wells and streams.

28. During the past three years our communities have been very carefully instructed in sanitary and preventive measures and principles, and I think that I can see a marked difference in the number of contagious diseases and the duration of any threatened epidemic of the same. An epidemic of diphtheria in 1878 has borne good fruit in this direction, as that was stamped out after six months' prevalence by a rigid quarantine and by disinfecting measures. I think that I checked another epidemic in March, 1880, by the same means, confining it to the family in which it originated.

In our town the health board take a great deal of pains to enforce the known laws of prevention, to which, in a great measure, I attribute our immunity from zymotic and contagious diseases. We look after cess-pools, privies and all suspected causes of disease, with satisfactory results.

C. C. HUCKINS, M. D.

Greene, Butler county.

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*For counties comprising this division, see page 79 and map.

†The figures at the beginning of paragraphs refer to Circular 28B, on pages 75–77.

REPLIES OF D. M. WICK, M. D., NEW HARTFORD, BUTLER COUNTY.

*1. New Hartford—not incorporated; number of inhabitants for township and town; 975.

2. Six.

3. A section in the northern part of Grundy county, and a section in the southern part of Butler county.

4. About the same as other years, or perhaps owing to the prevalence of diphtheria it was greater.

5. Greater; from 50 to 75 per cent greater.

6. Diphtheria.

Diphtheria, owing to the want of knowledge among the people of its contagious nature, was unusually prevalent.

8. Pneumonia.

9. Mild winter of 1879 and 1880 and pleasant spring months.

10. Diphtheria and its contagious nature.

11. Diphtheria.

12. Pneumonia.

13. Mild winter and spring.

14. October and November; rates low.

16. Scarlet fever, 16 cases; diphtheria, 23; typhoid fever 2.

17. Small-pox; cholera.

18. Diphtheria; January, February, June and July; scarlet fever, November and December.

19. Sore throat and cholera among the hogs in September and October.

20. Cannot give you any different answer; though it was very wet in June and the fall month; windy during spring months; October, November and December were cold months.

21. July, driest; May, August, October and November.

22. July of 8 degrees.

23. September.

24. Fifteen to twenty feet.

25. ....

27. July.

28. The causation or communicability of diphtheria was owing largely to the ignorance among the people as to its contagious nature. A case illustrating: diphtheria broke out in a certain family owing to filthy surroundings. Two children died. Some of the clothing was taken to a distant neighborhood and washed in a family where were children. In less than a week two deaths occurred in this family, and there had been no cases in the neighborhood.

Very respectfully,

D. M. Wick, M. D.

Greene, Butler county, April 29, 1881.

REPLIES OF E. L. THORP, M. D., OF SHELL ROCK, BUTLER COUNTY.

1. Incorporated town of Shell Rock, population, 719.

2. About 25.

3. Six miles square.

4. The same.

5. The same.

6. Diphtheria.

7. No more than epidemic.

8. Continued fever.

9. To steady cold weather.

10. Diphtheria.

11. None.

12. Scarlet fever.

13. Steady cold weather.

14 About an average with other years.

15. None.

16. About 60 cases diphtheria.

17. Have had none of the above.

19. Diphtheria more or less for two years.

19. Hog cholera to large extent.

The remaining questions I am not able to answer.

E L. Thorp, M. D.

Shell Rock, Butler county.

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*The numbers at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

REPLIES FROM A. O. STROUT, M. D., OF PARKERSBURG, BUTLER COUNTY.

I forward a record of diphtheria cases in my own practice that was made up two months ago, and I have had a good many cases since. If the Board desires any information not found in that, I will gladly comply with any request they may make.

We have had diphtheria, both in the town and county, continuously for ten months prior to September 18th, and are still having cases.

By way of preface, lest I shall be misunderstood, I will state that all the cases reported in this paper are *genuine diphtheria*, and that no case of follicular pharyngitis or other form of sore throat has been taken into consideration.

During this time, however, I have kept a record of over fifty cases of follicular pharyngitis (and many cases I did not record) where the patient would be confined to the bed from three to five days, with a high fever and a very sore throat, characteristic of that disease, but entirely unlike diphtheria to an experienced observer. I have never seen an epidemic of diphtheria that was not accompanied with an epidemic also of this disease; and, I am sorry to say, many practitioners call these cases diphtheria; some, perhaps, through ignorance, and many, to enhance their reputation.

In the following table I have classified the patients according to their several ages at the time of the attack:—

From one year of age	1 case.
From one to two years of age	2 cases.
From two to three years of age	6 cases.
From three to nine years of age	22 cases.
From nine to twelve years of age	13 cases.
From twelve to fifteen years of age	12 cases.
From fifteen to twenty years of age	9 cases.
From twenty to thirty years of age	4 cases.
From thirty to forty years of age	3 cases.
Total	72

Thus it will be seen that the liability to the disease under one year of age is comparatively nothing; while from one to two years of age it is not materially increased; but from two to three years the susceptibility increases quite fast; and from three to fifteen years it reaches its maximum, and again diminishes, until at forty it has nearly ceased again.

The following table shows the mode of death:—

Croup	0
Blood poisoning	17
Uræmia	5
Œdema of the lungs	1
Embolism	1
Total	24

During this epidemic the croupous form has seldom been seen. The greater portion (nearly 71 per cent) die from blood poisoning.

I have observed that those cases that get well usually commence to improve from about the end of the fifth day of the attack. On the other hand, where they do not recover they usually get worse very rapidly during the latter part of the fifth day, and die from the sixth to the tenth day, but many more on the sixth and seventh than later.

When uræmic symptoms supervene it has usually occurred about the fifteenth day, and after the patient had become convalescent, with the exception of one case, when it came on the twelfth day. I am unable to predetermine what cases will be attacked with this trouble, but have observed in all thus attacked the membrane came off very slowly. But the amount of the membrane or the constitutional disturbance is no index.

When these uræmic symptoms have arisen, I know of no remedy or combination of remedies that will arrest its progress, as they die in from eighteen to twenty-four hours.

The patient with œdema of the lungs lived thirty-four days from the date of the attack. He had been convalescent over two weeks, and I considered him well, with the exception that he was paralyzed so he could scarcely walk, and could eat and drink with great difficulty. He seemed to be doing finely till twenty-four hours prior to death.

One died from heart-clot while attempting to arise from the bed.

As will be seen from the table giving modes of death, I have lost twenty-four patients out of seventy-two, or 33⅓ per cent. But those figures need some explanation, as they include consultations; and in quite a number of the cases I was not called till the patient was virtually dying.

Exclusive of consultations, and where I was called at the commencement of the disease, I find fifty-eight cases recorded, of which ten died, or 17½ per cent; which therefore represents my actual per cent of loss.

It is a big death rate, but when I look back over these cases I congratulate myself that it is not larger.

A table showing age at time of death:—

Under two years of age	3 cases.
From two to five years of age	2 cases.
From five to nine years of age	4 cases.
From nine to twelve years of age	4 cases.
From twelve to fifteen years of age	7 cases.
From fifteen to twenty years of age	3 cases.
Twenty-two years of age	1 case.
	24

By comparing this with the table showing the number of cases attacked for each year of age, the comparative mortality for each period can be obtained.

Thus, all the cases under two years of age died; while out of twenty-eight cases from two to nine years old only six died; and of thirteen from nine to twelve years old four died. But of twelve cases from twelve to fifteen years old, seven died, or 58⅓ per cent; and nine cases, from fifteen to twenty, lost three cases, or 33⅓ per cent.

Hot or cold weather does not influence the disease in any way, either in its virulence or contagiousness. But I think cold, damp weather, or hot, cloudy weather, makes any given case more malignant. I don't think it affects the spreading of the disease materially.

Respectfully,

A. O. Strout, M. D.

Parkersburg, Butler county, November 15, 1881.

REPLIES FROM A. A. NOYES, OF MASON CITY, CERRO GORDO COUNTY.

*1. Mason City, inhabitants 2,510; of county, 11,461.

2. In the whole county, ninety-one deaths from all causes.

3. Cerro Gordo county.

4. I think about the same, considering everything.

5. About an average.

6. Diphtheria, and more fatal cases.

7. I cannot assign any cause, unless it be so much south-southeast wind and a damp atmosphere. Astronomers, I believe, contend that the close proximity of the planets has had something to do with diseases and their results. I am ignorant on that point.

8. Nothing in particular.

9. We are on very high ground, and very clear from any malarious infection, having the very best of natural drainage. Our whole county is underlaid with pure white limestone and water as pure as crystal; although I think this water, being so full of lime, is apt to cause trouble with the urinary organs.

10. Diphtheria and perhaps scarlatina.

11. I cannot, more than answer to 7.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, pages 75–77.

12. We have never had an epidemic of any description; therefore, cannot say as any.

13. High altitude and pure air and water.

14. January and February our fatal cases of diphtheria occurred. fourteen in number. In May the scarlet fever cases occurred. of which two died—and a high rate for this locality.

15. I refer to No. 14.

16. Diththeria, fifty cases and fourteen deaths; scarlet fever, ten cases and three deaths; typhoid fever, fifteen cases and three deaths; measles, ten cases and no deaths; whooping-cough, none in the past year; cerebro-spinal meningitis, sixteen cases; inflammation of the brain, two cases and two deaths.

17. No small-pox, cholera nor whooping-cough.

18. I refer to January and February for diphtheria with us; and anything tinctured with malaria, including fevers, August, September and October; with lung complications. March. April and May. We have considerable complaint of lung trouble.

19. I believe nothing, except slight epizootic in horses prevailing in September and October.

20. I cannot give anything like a correct statement, as I kept no monthly report or memoranda.

21. I do not know as I understand what is meant by soil moisture. The whole amount of rain-fall during the year was twenty-three inches.

22. The greatest drought was from 15th of July to September 15th.

23. The most and heaviest rainfall was in May and June.

24. In our city, forty to forty-five feet to water. In the country about, the different parts of the county average some sixteen feet to water in wells.

25. Some of these wells go dry in some parts of the season, and at other times in the wet season nearly full.

26. Refer to 23.

27. Refer to 22.

28. Filthy habits, poor ventilation, impure atmosphere, poor drainage or defect in sewerage, the accumulation of filth in streets and alleys, etc.

Although imperfect, so it be.

Respectfully,

A. A. Noyes, M. D.

Mason City, Cerro Gordo county, May 3, 1881.

REPLIES OF C. H. TIDD, OF GENEVA, FRANKLIN COUNTY.

*1. The village of Geneva contains about 150 inhabitants, and the township about 826.

2. Three deaths; one of old age—eighty-three years old; one infant from inanition; and 1 from cordiac hypertrophy, with valvular complications.

3. Geneva township, including the village—part of Osceola township and part of Reeve township, Franklin county.

4. About an average.

5. About 50 per cent less.

6. None.

7. ....

8. We have never had any *single type* of disease since I have been here that has proven fatal, it being a *very healthy* locality.

9 to 15 see 6, 7, and 8.

15. We had nothing unusual; our diseases were pneumonia in mild form, some bilious remittent and intermittents, summer complaints, etc., among children, but all were easily managed.

16. Scarlet fever, 2 mild cases; typhoid fever, 1 case: ran a mild course; recovered; measles, 4 cases (though there has been 96 cases since January 1, 1881); diphtheria, 2 mild cases.

17. Small-pox, cholera, whooping-cough, cerebro-spinal meningitis.

18. *January*, *February*, and *March*—considerable trouble from pneumonia, although the most cases in any one month were in March.

April, *May*, *June*, and *July*—unusually healthy.

August and *September*—Diarrhœa, some dysentery and a few cases of cholera morbus; 3 or 4 cases in infants almost amounting to cholera infantum.

October—Some intermittents.

November and *December*—Quite healthy.

19. During *November* and *December* hog cholera was prevalent to a slight extent, but not a tithe of what it was in 1879.

Probably 50 hogs will cover the loss (so different farmers inform me).

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

20. January and February unusually free from storms; March, heavy snows, April snow and rain more than usual, May and June unusually pleasant and free from heavy rains. July was the hottest and dryest for that month, we ever had in this locality. August dry. September unusually hot and dry, so much so that farmers had to stop plowing. October warm and dry. November and December very cold; December heavy snow-storms.

21. July, August, September, and October, driest ever was known here; January and February dry for the season; March, heavy snow; April, May, and June had probably the most rain of all, but it was not heavy; November and December dry; no rain; but some snow-storms.

22. July, August, September and October.

23. There were no unusually wet months, it being an unusually dry year.

24. On the north side of the township about 10 feet; about the center of the township, running east and west about 22 feet; south side of township, running east and west about 15 feet.

25. About 12 to 15 feet (this is only an estimate, gleaned from farmers in different parts of the district).

26. Not unusually high at all.

27. In September and December.

28. ....

Respectfully,

C. H. Tidd, M. D.,

Geneva, Franklin county.

REPLIES OF A. M. TUTTLE, M. D., OF BRITT, HANCOCK COUNTY.

*1. Not incorporated; inhabitants 345.

2. Nine.

3. Britt township, Hancock county, Iowa.

4. Increased 5 to 10 per cent.

5. Greater by 15 per cent.

6. Cholera morbus and infantum. So diagnosed

7. Accumulating filth with *very little* drainage.

8. None.

9. ....

10. In general; crowded houses; poor ventilation, and decomposition of vegetable matter, especially the *roots from the upturned prairie the previous year*, and specifically one of Buchanan's bogus diplomas.

11. ....

12. ....

13. ....

14. August and September nearly every case of cholera infantum or morbus, which were probably only severe cases of diarrhœa; one case of erysipelas and death.

15. There were no unusual diseases.

16. There were two cases of scarlet fever. Diagnosis doubtful.

17. Small-pox, cholera, typhoid fever, measles, whooping-cough, cerebro-spinal meningitis, diphtheria.

18. Impossible; only the diarrhœa of August and September.

19. Nothing of the kind happened to the lower animals.

20. Dry in early spring; wet in early part of summer, and *very* dry from August to December, when the snow began to fall.

21. Dryest, November, December, October, September, August, May, April, March, January, February, June, July.

22. November, December, October, September.

23. June, July.

24. Forty feet if dry weather, otherwise 18 to 20.

25. January, 30 feet; February, 30; March, 24; April, 26; May, 28, June, 18; July, 15; August, 24; September, 32; October, 37; November, 40; December, 40.

26. July, June.

27. December, November October, May.

28. I have had two instances occur, showing *very plainly* that it is very dangerous to life and health for one person to *constantly* watch over cases of tubercular consumption. It ought not to be allowed.

I think the English method of sending a *competent* person to investigate the cause of every death from typhoid fever, with power to remove it, a good one.

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*The numbers at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

Not having been here but a few months I have encountered considerable difficulty in getting information to enable me even to approximate correct answers.

Hoping what little I may be able to do will profit the Board and further its object, I am, Yours truly,

A. M. Tuttle, M. D.

Britt, Hancock county, May 3, 1881.

REPLIES BY B. F. BUNCH, M. D., OF LISCOMB, MARSHALL COUNTY.

*1. Incorporated town of Liscomb; population, 452.
2. I would say twelve or fourteen.
3. Marshall county and part of Hardin county.
4. In my opinion, it was less.
5. Take the territory over, about an average.
6. Diphtheria.
7. Cannot assign the cause.
8. Dysentery, typhoid fever.
9. No opinion at present.
10, 11, 12, and 13. No remarks.
14. Probably April and August: low.
15. Cerebro-spinal meningitis, small-pox.
16. A few cases of typhoid, spinal meningitis, measles, and diphtheria; do not know the number.
17. Small-pox, scarlet fever, whooping-cough.
18. Diphtheria mostly in the spring, March and April; dysentery, spinal fever, typhoid fever, August, September.
19. Cannot answer.
20 and 21. No report.
22. I think, in July.
23. September.
24. Probably about thirty feet.
25, 26, 27, and 28. Not prepared to give anything authentic.

B. F. Bunch, M. D.

Liscomb, Marshall county, April 5, 1881.

REPLIES OF G. A. MEREDITH, M. D., OF AMES, STORY COUNTY.

*1. Ames; Incorporated; 1,153.
2. Four or five.
3. Incorporated town of Ames.
4. About the same.
5. Could not tell positively; will be better prepared to answer for succeeding years.
6. Typhoid fever.
7. Cannot positively; possibly filth.
8. ....
9. Good luck.
10. Typhoid fever.
11. In Ames, one death from typhoid fever (so called) was in a debilitated person, and the history of the case I am unacquainted with. The other—there being only two—was imported.
12. Scarcely any other deaths from infectious or contagious diseases.
13. No hygiene on the part of citizens.
14. ....
15. From August, 1880, to January of present year.
16. Typhoid fever, 2; diphtheria, 1; the other cases were called typhoid fever, but think it doubtful.
17. Measles, scarlatina, cerebro-spinal meningitis, small-pox, cholera.
18. Could not.
19. Cannot tell.
20. Unusually cold during November and December.
21. Have no record by which to answer correctly.
22. ....
23. February, March, and May.
24. Varies greatly; from two to twenty feet. An abundance of water may be found in a locality in from two to ten feet; and in less than a hundred feet from there, you can't find any water until you pass through the blue clay, which is very thick in places.
25. Have no statistics for ascertaining.
26. ....
27. ....
28. I have nothing for 1880, within the incorporated town of Ames.

I am sorry that I cannot answer many of your questions more definitely. Shall be better prepared for 1881.

G. A. Meredith, M. D.

Ames, Story county, April 12, 1881.

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*The figures at the beginning of paragraphs refer to Circular 28B, on pages 75–77.

REPLIES FROM H. T. BALDY, M. D., TOLEDO, TAMA COUNTY.

*1. Toledo; incorporated; 1,026.

2. About twenty-five.

3. Toledo city and township.

4. About the average, except greater in old people.

5. About the same as average.

6. Scarlet fever, measles, and diphtheria.

7. Excessive heat, great drought and scarcity of water.

8. Typhoid fever, cerebro-spinal meningitis, whooping-cough.

9. Can assign no particular reason.

10. Scarlet fever, diphtheria, measles, and old age.

11. In certain localities, garbage and filth, acted upon by great heat.

12. Typhoid fever, cerebro-spinal meningitis, whooping-cough, phthisis.

13. Can assign no particular reason.

14. April and May, most scarlet fever and diphtheria; rate low.

15. Cannot answer.

16. Small-pox, none; cholera, none; scarlet fever, 4; typhoid fever, none; measles, 3; whooping-cough, none; cerebro-spinal meningitis, none; diphtheria, 3. Opinion only.

17. Small-pox, cholera.

18. *April*—Most scarlet fever.
May—Measles.
July, *August*—Diarrhœa.

19. In September and October cholera prevailed among the hogs in certain localities, and was quite fatal.

20. Wet in April; dry in July and August; in October, hail-storm.

21. April, May, January, February, March, June, July, August, September, November, December, October.

22. In April, dry.

23. In October, moist.

24. Our location is quite undulating, and the depth of earth above ground water varies from fifteen to eighty feet.

25. Cannot do so accurately.

26. April and May the highest. Only opinion.

27. July and August the lowest.

28. Do not know that I can communicate any particular facts or cases; nothing more than the usual causes; viz., filth, poor ventilation, food and raiment, and perhaps particular localities.

All of which is respectfully submitted.

H. T. BALDY, M. D.

Toledo, Tama county, May 24, 1881.

REPLIES OF A. W. BERRYMAN, M. D., OF MONTOUR, TAMA COUNTY.

*1. Montour; 457.

2. About six.

3. Montour and Indian Village township.

4. Less. At least ten per cent less.

5. Less. Diminished about forty per cent.

6. Perhaps scarlatina maligna.

7. Scarlatina maligna, for lack of proper care, being most prevalent among Bohemians.

8. Almost all fevers coming from malaria.

9. To our dry seasons.

10. See No. 6, above.

11. I cannot, more than suggested in No. 7.

12. Rubeola and fevers.

13. Less prevalence of these maladies.

14. Scarlatina maligna, high in July.

15. None.

16. Small-pox, none; cholera, none; scarlet fever, about 8; typhoid fever, 3; measles, about 15; whooping-cough, a great many; cerebro-spinal meningitis, none; diphtheria, none.

17. Answered in No. 16.

18. ....

19. None, except horse distemper in December, which became very general.

20. Cannot, having no memorandum.

21. Last season, as a whole, was dry; July and August especially so.

22. Answered in 21.

23. None; having a greater altitude.

24. About 20 feet in town; surrounding country, 30 to 40 feet.

25. Don't vary much.

26. None.

27. In September and October.

28. Nothing special for this report.

A. W. BERRYMAN, M. D.

Montour, Tama county, March 31, 1881.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, on pages 75-77.

SOUTHERN DIVISION.*

REPLIES FROM C. N. UDELL, M. D., OF CENTERVILLE, APPANOOSE COUNTY.

†1. Incorporated; 2,465.

2. Twenty-five; approximate.

3. The city of Centerville.

4. About an average.

5. About the same; a small decrease from sickness, and a small increase from accident; more coal mines operated.

6. More than usual deaths from pertussis.

7. ....

8. Perhaps malarial.

9. About an equable amount of heat and moisture.

10. None, unless accident and pertussis.

11. Cannot answer.

12. If any, malarial.

13. Milder attacks.

14. Spring months high, balance low.

15. None.

16. Cannot give an opinion. Whooping-cough was quite prevalent, and of severe type.

17. Small-pox, cholera, typhoid fever, cerebro-spinal meningitis.

18 Cannot.

19. Hog cholera, chicken cholera.

20. Was a cyclone in September, not doing much damage.

22. None.

23. None.

24. Twenty feet.

25. Cannot; in September, say ten feet; December, fifteen to eighteen feet.

26. September.

27. December.

28. Have none.

I send almost a worthless report. The only excuse I can offer is, that in common with many others, I commenced practice in this county thirty-two years ago, and neglected to keep a case book, or memorandum of cases, deaths, etc., or any record of epidemics, endemics, etc.; and as we begin we are apt to continue. So now am in the dark.

Very respectfully,

N. UDELL, M. D.

Centerville, Appanoose county, April 21, 1881.

REPLIES OF S. H. SAWYER, M. D., OF UNIONVILLE, APPANOOSE COUNTY.

My practice is mostly a country practice, embracing about six townships in the northeast part of Appanoose county and the northwest part of Davis county, average population of each township about 1,200.

Deaths from all causes in 1880 not quite so numerous as usual, but slightly decreased. Amount of sickness not so great as usual during the year. There was not so much malarial disease or typhoid fever as usual, nor was there any severe epidemic of any character whatever. There was during the winter and spring an unusual amount of chronic gastric catarrh, accompanied in most cases with hepatitis and general depraved condition of the system, marked cachectic condition occurring mostly in elderly males, markedly fatal, and from this most of our deaths have occurred. But for this, there would have been a marked diminution in the number of deaths. The number of deaths from acute diseases of all kinds was less than usual.

During almost every month in the year there was an occasional case of diptheria; mostly mild. No deaths from it.

There occurred during the year about twenty cases of scarlatina; eighteen of typhoid fever; sixty of measles; one hundred of whooping-cough; cerebro-spinal meningitis, four. No cases of small-pox or cholera during the year.

In *January* occurred catarrhal fever, bronchitis, pneumonia, cerebro-spinal meningitis, and croup, two cases each.

In *February*, whooping-cough, bronchitis, pneumonia, rheumatism, and chicken-pox.

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*For counties comprising this division, see page 79 and map.

†The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

In *March*, pneumonia, pleuro-pneumonia, bronchitis, whooping-cough, and rheumatism.

In *April*, bronchitis, catarrhal fever, pleuro-pneumonia, influenza, rheumatism, tonsillitis, pharyngitis, diptheria.

In *May*, bronchitis, tonsillitis, measles, whooping-cough, scarlatina, and rheumatism.

In *June*, measles, whooping-cough, rheumatism, bronchitis, and a few cases of malarial fever.

In *July*, intermittent and remittent fevers, cholera infantum, and cholera morbus.

In *August*, same as July, malarial diseases, diarrhœas, and dysentery.

In *September*, about the same as August, with a few cases of typhoid fever.

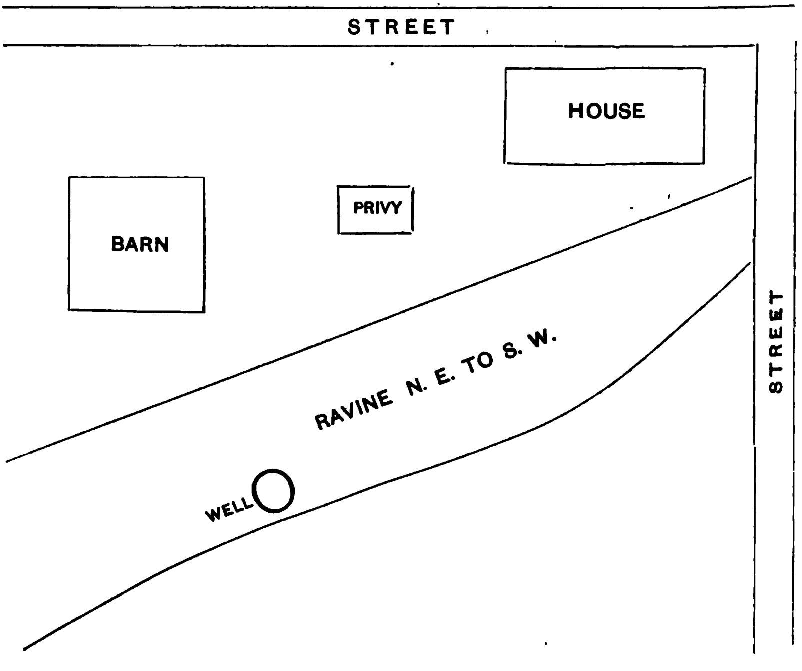
In *October*, the same increase of typhoid and typhus malarial cases, and a few cases of rheumatism.

In *November* and *December* the same, typhoid and malarial fevers, rheumatism, whooping-cough, bronchitis, and pneumonia.

Distemper among horses in summer and early fall; epizootic later, and subsequently, in December, the distemper occurred again, being somewhat fatal with horses which had previously had epizootic; distemper, quite prevalent; epizootic, almost universal. Hogs and chickens suffered from cholera during the spring and also in the fall; disease prevailed quite extensively, but was not attended by usual fatality.

Having no record, I am not able to answer questions in regard to rain-falls, etc. In general terms, we had the first part of April heavy rains; last half of April and all of May unusually dry; June, good average rain-fall; July, August, and first half September, dry. For the balance of the year about ordinary rain-fall; no excessive rain during the year. To question 24 I would say, thirty-six to forty feet, and has varied but very little during the year.

Typhoid fever occurring in one family was attributed to a large cellar under the house filled with vegetables, a box of meat, and garbage generally, submerged in water five feet in depth for three months, with drain into well a short distance away. In a second family four cases of severe typhoid fever occurred. The well, from which all water was used, was nearly one-eighth mile from the house in a ravine. The privy, without a vault, was between the house and the well. The following diagram will illustrate the premises:



Barn and feed lots on level with the house. Well, 300 feet distant from the barn, one-eighth mile distant from the house, in a ravine; well, thirty feet below the level of the barn, forty feet below the level of the house, and twenty feet deep. Privy, without vault, between the house and well.

Observe that the well is so situated as to receive drainage from the house, privy, and a large part of that from the barn and feed-lot.

S. H. SAWYER, M. D.

Unionville, Appanoose county, Iowa, April 12, 1881.

REPLIES OF L. C. WAILES, M. D., OF CAMDEN, APPANOOSE COUNTY.

*1. Camden is a small village in the west part of Appanoose county, population 51.

2. No deaths during the year 1880 in this village.

3. From the west line of Appanoose county eastward eight miles; four miles south of Camden, and eight miles north.

4. The amount of sickness was greater; how much greater I cannot say; my opinion is fifteen per cent or more.

5. Greater; how much I cannot say.

6. Whooping-cough, catarrhal fever, cholera morbus, cholera infantum, and intermittent fever.

7. Whooping-cough had not made its appearance for several years to any considerable extent previous to 1880; therefore there were more subject to attack than there would have been had it appeared oftener, or annually. The violence of attack was also greater, attributable to being complicated in some cases with catarrhal fever. I know of no real cause why catarrhal fever was more prevalent than usual; it certainly was not caused by damp, cold air, from the fact it made its appearance in July, when the air was both warm and dry. When it first made its appearance it was in a light form, and gradually got worse the remainder of the year. I attribute the unusual prevalence of cholera morbus and cholera infantum to the unusual dry and hot weather in June and July; also to the unusual amount of malaria, as shown by the unusual amount of intermittent fever. the hot weather producing relaxed muscles, impairing the powers of life, and deranging digestion, resulting in irritation. congestion, and in some cases inflammation of the intestinal tube. while the malaria produced congestion of the spleen and liver. The result was an unusual amount of cholera morbus and cholera infantum. I know of no cause why intermittent fever was more prevalent than usual.

8. Other diseases than those enumerated were prevalent about as usual.

9. See answer to No. 8.

10. Whooping-cough, catarrhal fever, cholera infantum.

11. See answer to No. 7.

12. The mortality from other diseases than those above enumerated was about the same as usual See answer to No. 6.

13. Mortality about the same as usual, except as above specified.

14. Whooping-cough made its appearance the first week in March; mortality high; cholera infantum the 15th of June; mortality high; catarrhal fever in July; mortality high; late in season.

15. Scarlet fever in November; a few cases in light form; catarrhal fever in July.

16. Cannot answer all positively; small-pox, none; cholera, none; scarlet fever, a few cases in light form; typhoid fever, a few cases in light form; measles, very little; whooping-cough, very numerous, and very severe; cerebro-spinal meningitis, none; diphtheria, some scattering cases, none malignant; catarrhal fever, numerous cases in severe grade.

17. See answer to 16.

18. See answer to 14 and 15.

19. The epizootic or distemper occurred among horses in February, in a light grade at first; gradually got worse the remainder of the year; killed some horses late in the year. Some of the cattle appeared to be affected in a similar way. The disease called black-leg occurred among cattle in September; did not prevail to any considerable extent.

20. Cannot answer in full.

21. June, October, July, May, January, September, April, November, December, August, February, March.

22. June, July, and October.

23. February and March.

24. Average depth about twenty feet.

25. All wells do not appear to be

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

affected by dry or wet weather to the same extent, though most wells are affected from two to four feet; some still more. Streams when full are about eighty feet below the high prairie. The streams vary between high and low water about fifteen feet. Water in wells and streams very low in June, July, and October.

26. February and March.
27. June, July, and October.

For the better protection of life and health within this State, I would suggest that we urge the passage of a law by our next General Assembly, that will prohibit persons from practicing medicine, surgery, or midwifery within this State unless they are graduates of some respectable medical college, or unless they have been in practice ten years within this State, or have a certificate of worthiness from a board to be created, or the State Board of Health. Some other States have had similar laws for several years, which has caused Iowa to be crowded with inferior practitioners. The evils of this I have witnessed myself. Let the people have protection.

L. C. Wailes, M. D.

Camden, Appanoose county, May 10, 1881.

REPLIES OF R. CUMMINS, M. D. OF MORAVIA, APPANOOSE COUNTY.

*1. Moravia; unincorporated; one hundred and seventy-three inhabitants.
2. Two deaths during the year 1880, in town.
3. The following answers are for a territory three miles from town each and all directions.
4. The amount of sickness was about an average during previous years or, probably, a little less than an average.
5. The average deaths was probably twenty per cent greater than the average for previous amount of sickness.
6. Pulmonary and bronchial diseases or deaths were more prevalent than for previous year's sickness.
7. I cannot do so now.
8. Typhoid fever.
9. I attribute the lessened prevalence of it to the unusually dry season.
10. No greater mortality than usual.
11. I have no cause to assign now.
12. None.
13. None to attribute from this locality.
14. I cannot mention any month as greater than another.
15. None to mention.
16. Small-pox, none; cholera, none; scarlet fever, three; typhoid fever, estimated twenty; measles, five or six; whooping-cough, about twenty-five or thirty; cerebro-spinal meningitis, none; diphtheria, eight or ten, very mild; no others that I now recollect.
17. Small-pox, cholera, cerebro-spinal meningitis.
18. I cannot give a definite answer.
19. In March the cholera with hogs to a very limited extent.
20. Having no notes to found an answer from, I cannot give a correct answer.
21, 22, 23, 24, 25, 26, 27, 28. I have no statistics that will enable me to give anything like a correct answer.

I believe I have no suggestions to make at present. I have had but little time to look up matters relative to the questions heretofore; but will try and do so hereafter. Respectfully,

R. Cummins, M. D.

Moravia, Appanoose county, April 18, 1881.

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* The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

REPLIES OF J. M. STURDEVANT, M. D., OF CINCINNATI, APPANOOSE COUNTY.

*1. Incorporated town; number of inhabitants, one hundred and eighty-nine.

2. Three.

3. Town.

4. About an average for the last twenty years.

5. Same as number four.

6. No marked difference from former years.

7. Lack of cleanliness.

8. None designated.

9. None designated.

10. If any difference, I shall say pulmonary consumption.

11, 12, 13. I have not taken any special note.

14. Diphtheria in the country practice March and April; *high rate.*

15. No unusual diseases prevailed.

16. (Opinion) scarlet fever, ten; typhoid fever or typho-miasmatic, twenty; diphtheria, sixty-five.

17. Small-pox, cholera, measles, whooping-cough, cerebro-spinal meningitis.

18. Lung diseases the first four months; diseases of the stomach and bowels the next four months; and typhoid fever and miasmatic fevers the last four months. Diphtheria prevails mostly in damp and changeable weather.

19. Epizootic or malignant distemper with horses the first six months, and hog and chicken cholera the last six months.

20, 21, 22, 23. The year was about an average season with us, and March and April were very wet, while September, October and November dry.

24, 25. Wells are from twenty to sixty feet in this locality; streams shallow.

26. About an average for southern Iowa.

27. . . . .

28. Surface water that filters through decayed vegetable matter and used as a drink in the spring of the year, unclean wells, dirty cellars, lack of pure air in sleeping-rooms, etc.

Respectfully yours,

J. M. STURDEVANT, M. D.

Cincinnati, Appanoose county, May 28, 1881.

REPLIES OF J. W. YOUNG, M. D., OF BLOOMFIELD, DAVIS COUNTY.

*1. Bloomfield, Davis county; 1,531.

2. About thirty.

3. Bloomfield, Iowa.

4. Less—I would say ten per cent.

5. Less—I would say ten per cent.

6. Malarial diseases.

9. To less rain-fall.

12. Malarial diseases.

13. To less frequent rain-fall and pleasant weather.

14. July and August; less intestinal diseases in children.

15. November, six; a light grade of scarlatina.

16. Small-pox, none; cholera, none; scarlet fever, six; typhoid fever, none, except a typhoid condition as a regular; measles, none; whooping-cough, forty or fifty; cerebro-spinal meningitis, none; diphtheria, a few sporadic cases.

17. Small-pox, cholera, measles, cerebro-spinal meningitis.

18. None, except those common to all parts of upland in Iowa.

19. Hogs have had what farmers called cholera; however, a less number has been lost than usual. No anthrax, no trichinæ.

20. Not prepared. A great windstorm passed near town in the month of April.

21. No data to draw from, except memory; July, August and September were dryest.

22. None—unusually dry.

23. None—unusually moist.

24. Twenty-seven and one-half feet is claimed.

25. Greater.

27. Lower all the year than common; will say August and September.

28. I believe nothing special can be learned from this town, except that the weather was seasonable at all times of the year. During the warm months our board caused a general cleaning up of the whole town, and I believe it is one of the factors in making good health.

Respectfully,

J. W. YOUNG, M. D.

Bloomfield, Davis county, March 29, 1881.

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

REPLIES OF W. A. TODD, M. D., OF GARDEN GROVE, DECATUR COUNTY.

*1. Incorporated town; number of inhabitants five hundred and forty-nine.

2. Number of deaths five or six.

3. Four miles square.

4. Rather less; perhaps five per cent.

5. About the same.

6. Scarlet fever.

7. Cannot answer.

8. Malarial and typhoid fevers.

9. Most likely the unusally dry weather for several months preceding.

10. None.

11. ....

12. Perhaps no one.

13. ....

14. ....

15. Scarlet fever January, February, March, April and May.

16. Scarlet fever, about thirty; measles, one.

17. Small-pox, cholera, typhoid fever, whooping-cough, cerebro-spinal meningitis, diphtheria.

18. *January*, scarlet fever, pneumonia, ague, neuralgia.

February, scarlet fever, pneumonia, rheumatism, erysipelas, neuralgia, ague, malarial fevers.

March, *April* and *May*, about the same as February.

Each of the summer months about the same, except that scarlet fever was about and had occasional cases of entero-colitis among children.

October, had one cases of measles which was the only one to my knowledge occurring.

In the remaining months there was no marked change in the character of the sickness.

19. Epizootic among horses in March.

20. January, generally warm, air moist, with heavy fogs at times; rain-fall very light. February, March and April much the same. May, warm; more rain than in the previous months. June, much the same as May, except much lighter rain-fall. July and August, warm; much greater rain-fall and more cloudy weather. September cooler, less rain than than in July and August. October and November, cool and generally dry atmosphere. December, cold and dry.

21. June. April, March, January, February, November, December, October, September, July, August.

22. June, October, November.

23. I think, at no time.

24. Thirty-five to forty feet.

25. In the first six months, twenty to thirty feet; water stood at about that in wells; last six months, from two to five feet lower, many wells being dry.

26. At no time.

27. The latter six months.

W. A. TODD, M. D.

Garden Grove, Decatur county, April 12, 1881.

REPLIES OF V. L. CHESTER, M. D., OF GARDEN GROVE, DECATUR COUNTY.

*1. Number of inhabitants, five hundred and forty-nine.

2. Five.

3. The incorporated town of Garden Grove.

4. It was less, one-third to one-half.

5. It was less.

6. None.

7. None.

8. Typhoid fever and intermittent fever.

9. The dryness of atmosphere and evenness of temperature.

10. None.

11. None.

12. For the reasons stated in 8 and 9.

13. To less prevalence of disease.

14. I have no data, but all diseases were attended with low rate.

15. February and March, scarlet fever.

16. Small-pox, none; cholera, none; scarlet fever, four or five; typhoid fever, none; measles, none; whooping-cough, none; cerebro-spinal meningitis, two; diphtheria, none.

17. Refer to 16.

18. *January*—Pneumonia, capillary bronchitis.

February—Scarlet fever, typho-malarial fever.

March—Scarlet fever and pneumonia.

The rest of the season was extremely healthy, and what sickness we had was billious fever, intermittent fever, etc.

19. None.

20. Nothing to report.

***The numbers at the beginning of paragraphs refers to questions in Circular 23B, pages 75-77.**

21. January had 0.10 inches rain-fall.
February " 1.10 inches rain-fall.
March " 1.00 inches rain-fall.
April " 1.25 inches rain-fall.
May " 2.85 inches rain-fall.
June " 1.00 inches rain-fall.
July " 5 95 inches rain-fall.
August " 5.00 inches rain-fall.
September " 3.00 inches rain-fall.
October " 1.80 inches rain-fall.
November " 0.20 inches rain-fall.
December " 0.30 inches rain-fall.
This includes melted snow, hail, sleet, etc. Total rain-fall for season, 23.55 inches.

22. January, November and December.

23. None.

24. Twenty to twenty-five feet.

25. I could give no definite opinion, as I never give attention to the matter in the least.

26. None.

27. None.

28. I have no cases bearing upon the subject.

V. L. CHESTER, M. D.

Garden Grove, Decatur county, March 31, 1881.

REPLIES OF T. ROBERTS, M. D., OF ST. CHARLES, MADISON COUNTY.

*1. St. Charles is incorporated; population, one hundred and eighty-three.

2. No deaths during 1880.

3. Territory having an average radius of five miles, with St. Charles as a center.

4. Average for the year would not differ much from other years.

5. Think it slightly decreased; cause, light mortality among children during the warm months.

6. We were singularly free from endemics during the year.

7. ....

8. Contagions, there being none.

9. Non-infection.

10. No disease assumed special prominence until the closing months of the year, when pneumonitis with various complications, became the most prevalent trouble.

11. There seemed to be a tendency, during the time just referred to, to catarrhal inflammations of mucous membranes, and to pulmonary congestion, but the death rate was inconsiderable.

12. Intermittent (?) phthisis, zymotic diseases, etc.

13. Benignity, or absence of above diseases.

14. None special to report.

15. No unusual disease with us.

16. Small-pox, none; cholera, none—but sporadic (morbus); scarlet fever, some cases of an exanthem about which there was much dispute, some claiming it to be scarlatina and others only a rash; I adopted the latter view, as all cases were light; typhoid fever, probably ten cases within the radius named; (some cases here are denominated the typho-malarial—the latter feature showing itself decidedly, while enteritis and other typhoid symptoms are unmistakably present: measles, none during 1880, but prevailing now; whooping-cough, none, I think—it passed through the vicinity two or three years before; cerebro-spinal meningitis, no cases to my knowledge—it was endemic here some eight years ago; diphtheria: that is a hard one; to accept the reports and opinions passed among the people and some physicians, we would have to say it prevailed; seriously, I do not think a case of true diphtheria occurred within the radius mentioned; aptha and simple ulcerated sore throat both prevailed, and were often called diphtheria.

17. Given sufficiently above.

18. To give that would have required the keeping a daily register of diseases treated, whereas in keeping our accounts in this section, the financial aspect of account-keeping has seemed to be all we have aimed to keep strict account of.

The midsummer and early fall months are those in which the most sickness generally occurs with us, and proceeds mostly from derangements of the digestive system, weakened by the heated term, and overloaded from the great plenty of vegetable products to be obtained at that time.

19. Mostly what is known as cholera, and prevailed among fowls and hogs. The extent was almost complete on some farms, and slight on others; the time, from midsummer to near the close of the year.

20. Kept no record, but I remember the usual hot season was more frequently relieved by showers than usual.

21. Kept no record of this, either, though I remember generally that the alternation of moist and dry was so

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*The figures at the beginning of paragraphs refer to Circular 23B ,on pages 75-77.

regular as to render it an excellent year for crops.

22. No statement but foregoing.

23. No statement but foregoing.

24. Average depth to water in wells, fourteen feet.

25. Spring and fall months, five to six feet; midsummer and midwinter months, eighteen to twenty.

26–27. For causes previously stated, the season was at no time unusually dry or wet.

28. We recognize in this (a part of the "Three River country"—South, Middle and North rivers—) the prevailing causation of disease as malaria, and find in it either the "grand mal," or an element of it the great majority of cases of sickness with us. The question of communicability involves many considerations: earth, air, water, food, etc. The germ theory, now on the tapis, supposes that all these agencies may communicate infection.

I can only answer many of the inquiries approximately, but have given them as nearly correct as I can.

Yours truly, etc., T. ROBERTS, M. D.

St. Charles, Madison county, March 25, 1881.

REPLIES OF H. C. HUNTSMAN, OF OSKALOOSA, MAHASKA COUNTY.

*1. Population, 4,598; incorporated.

2. One hundred, estimated.

3. City of Oskaloosa.

4. Greater; increased 25 per cent.

5. Increased 25 per cent (estimated).

6. Scarlatina.

7. Epidemic.

8. Miasmatic fevers.

9. Cool, seasonable summer months.

10. Scarlatina, anginose, and consumption among old people.

11. Scarlet fever.

12. Fevers, misasmatic.

13. Mildness of the type; favorableness of the season conducive to such fevers.

14. January, February, March, April, November, December, high; May, June, July, October, low; August and September, medium.

15. January, February, March, April, scarlet fever; September, October and November, diphtheria, typhoid fever.

16. Small-pox, none; cholera, none; scarlet fever, 300; cases (estimated): measles, 6 cases; whooping-cough, 25 cases; cerebro-spinal meningitis, none; diphtheria, 25.

17. See question 16.

18. During the first four months, 250 cases of scarlet fever; during the last four months, 25 cases of diphtheria.

19. Don't know; animals mostly healthy, so far as I am informed.

20. 1880 was marked, first by an unusually warm winter and late spring, winter being open; spongy most of the season, with very little snow and considerable rain-fall. Of the former there was only .28 of an inch when melted, while of the latter there was, during the first quarter, 2.65 fall. Much of this time there was thawing and freezing, alternately, with fogs and evaporations. The second quarter was characterized by light but frequent showers, a cool, fresh temperature. The third quarter by heavy thunder-storms and abundance of rain, less frequent, while the fourth quarter was shaded off from light rains to heavy, wet snows.

21, 23. Oskaloosa is situated on a plateau of ground seven miles south of the Des Moines River, and four miles north of the Skunk, and drained by shallow ravines, the principal ones are given off from the northeast and southwest. Into the one to the northeast is drained all that portion of the city lying in that direction from the square, including the night soil, etc., from the principal hotel, Donwing House and within one block from the square this drain is open. A fact worthy of note is that for the past ten years diphtheria has originated in the vicinity of the drain annually, and from this quarter spread to other parts of the city.

The water in the wells is fifteen to twenty-five feet from the surface. The soil is black sand loam, with clay subsoil.

H. C. HUNTSMAN, M. D.

Oskaloosa, Mahaska Co., August 29, 1881.

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*The figures beginning each paragraph refer to questions in Circular 23B, on pages 75–77.

REPLIES FROM C. N. UDELL, M. D., OF BLAKESBURG, WAPELLO COUNTY.

My replies of necessity will be very indefinite and unsatisfactory to myself, but after consulting with Dr. Berry (my only competitor here), and by reference to my case-book, also bringing into requisition my memory, I will report as best I can.

*1. Unincorporated town of 198 inhabitants.

2. Two.

3. Adams and Polk townships in Wapello county, and Urbana and Mantua townships in Monroe county, embracing about 2,500 inhabitants.

4. Diminished; probably near one-half.

5. About the same as the average; quite a number of old persons died during the year from chronic affections.

6. The various catarrhal affections and measles; cause of death, tuberculous consumption.

7. The winter of '79 and '80 being unusually open and wet.

8. Miasmatic diseases.

9. Not sufficient soil moisture during and just preceding the heated term. We had a long heated term, including much of June, July, August and September, yet during this time we did not have sufficient rain-fall to overflow the low lands. Neither did we have the usual southwest winds; two prominent factors in the production of malarial poison. In this locality miasmatic diseases, and the prevailing winds from the south-west hold the relation of cause and effect, or else they are almost universally coincident.

11. My opinion is advanced under No. 7.

12. The prevalence or non-prevalence of malarial diseases does not appear to to materially affect the death-rate, as these affections are generally amenable to treatment. The mortality was about average.

14. From January to April measles prevailed to a considerable extent, with rather an unusually low rate of mortality, only one aged person dying (from consumption) within this territory.

16. Typhoid fever, 8; measles, 200; whooping-cough. 60; diphtheria, 9; (measles and whooping-cough guessed at.)

17. Small-pox, cholera, scarlet fever, cerebro spinal meningetis.

18. *January*— Catarrhal affections, bronchitis, tonsillitis, pleuritis, pneumonia, rheumatism, croup, neuralgia, erysipilas.

February—Same as January, with a few sporadic cases of diphtheria.

March—Bronchitis, intermitting and remitting fever, tonsillitis, croup, erysipilas.

April—Remitting and intermitting fever, bronchitis, neuralgia, diarrhœa, pneumonia, miasmatic fever. I think those persons who were attacked with miasmatic fever carried the fever over from the preceding year, and the wet, open winter and spring was only an exciting cause.

May—Billious fever, tonsillitis, bronchitis, diarrhœa, rheumatism, neuralgia.

June—Bilious attacks, cholera morbus, diarrhœa, neuralgia.

July—Remitting fever, cholera morbus, diarrhœa, cholera infantum, and urinary troubles.

August—Remitting fever, diarrhœa, cholera morbus, cholera infantum, urinary troubles, neuralgia.

September—Remitting and intermitting fever, diarrhœa, cholera morbus, cholera infantum, neuralgia.

October—Colitis, diarrhœa, throat affections, bronchial.

November—Same as October; a few cases of erysipelas, etc.

December—Bronchitis, pneumonia, remitting fever, rheumatism, erysipelas, urinary troubles.

19. During February, March and December, 1880, the epizootic or influenza prevailed to a considerable extent among horses, but of rather a mild type. In September and October hog cholera was somewhat prevalent in the north and west of this territory. We cannot attribute this outbreak to any local cause. This disease appears to have been imported from Missouri by an extensive stock merchant. Chicken cholera has infested some localities, but I am unable to discover that the disease was confined to any particular locality or season of the year.

20. Having kept no meteorological tables or register my reply will be rather indefinite.

January and February were unusually warm and wet. The summer heated term was rather unusually long, embracing most of June, July, August and September—that is, continuously warm, while the thermometer did not register any unusually hot days. During this time, we had occasional showers, though most of the time a clear, blue sky (a persistent yellow sky portends ague). July was the dryest month; January wettest; July the hottest month; December the coldest. Cold weather came on in October, earlier than usual. October, November and December were dry.

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* The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

21. All I can say is embraced under No. 20.

22. In July and December.

23. January, February.

24. West half of Adams township, about twelve feet; east half of Adams township, about thirty feet; Polk township, thirty-five; Mantua and Urbana, about twenty feet, average.

25. Cannot estimate with any certainty. The rise and fall in wells and streams correspond to the surface moisture.

26. January.

27. July.

28. The diseases most prevalent in this section of country are those produced by miasma; such as intermitting and remittant fevers, congestive or pernicious fevers, periodic neuralgia, dysentery, tyhpo-malarial fever, etc. The requisite amount of heat and moisture, to cause the decay of a large amount of vegetation, is sure to be followed by the above named diseases, and the prevailing winds are from the southwest. Illustration: In the summer of 1878, we had our May and June freshets, the rainfall being sufficient to overflow the low lands. July was dry and hot; prevailing winds from the southwest. Nearly every family living on the north or northeast of any swamp or marshy district suffered from some form of malarial fever. Those living at the head of ravines even a mile from the marsh were affected, while those on the west and north of such marshes were not attacked, unless there were other marshes south or west of them. Some time near the last of August the wind changed and for a few days blew from the northeast and east, and, as a result, many were attacked with ague (in eight to ten days), in localities before exempt; namely, on the south and west of the swamps. Many of those who escaped the sickness at this time, had chills and fever the following spring.

Such observations, however, of course, are not new, but only help to confirm statements from others, years ago. The only preventive means seems to lie in the thorough drainage of the whole country.

The matter of devising means for the prevention of this class of diseases is of far greater importance than many physicians seem willing to admit. While comparatively but few deaths are reported as resulting directly from malarial poison, I feel well assured in my own mind that the *remote* cause of *very many* deaths is this subtle poison. Many reported as having died from dysentery, cholera infantum, some hepatic trouble, brain lesion, and even consumption and heart disease doubtless were the sequelæ of a malarial fever, or at least were developed by the presence of miasma or under the debilitating influence of it.

Respectfully submitted,

C. N. UDELL, M. D.

Blakesburg, Wapello county, April 11, 1881.

REPLIES OF THOMAS W. BAUGH, OF CARLISLE, WARREN COUNTY.

*1. Four hundred and fifty.

2. Four.

3. Allen township, Warren county, and Allen, Polk county.

4. Less; diminished one-third.

5. Less; diminished one-third.

6. Diphtheria.

7. Know of none.

8. All forms.

9. Do not know.

10. None.

11. Know of none.

12. All forms.

13. Do not know.

14. All forms were below the average.

15. Were none.

16. Typhoid fever, 3; diphtheria, 20.

17. Small-pox, cholera, scarlet fever, measles, whooping-cough, cerebro-spinal meningitis.

18. *March*—Diphtheria.

April—Diphtheria, 12.

November—Typhoid fever, 3.

19. Hog cholera prevailed to a limited extent during April and May, also October and November.

20. Quite hot during July and August.

21. Moist during February, March,

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* **The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.**

April, May, September, and October; dry in June, July, August, November, and December.

22. July and August.

23. Not in any.

24. From 12 to 18 feet in wells; 25 to 50 in streams.

25. July and August, 18 to 25.

26. Not in any.

27. July and August.

28. Can give none.

Respectfully,

Thos. W. Baugh, M. D.

Carlisle, Warren county, April 14, 1881.

REPLIES OF F. W. FLOWER, M. D., OF ALLERTON, WAYNE COUNTY.

1. Allerton is incorporated and contains a population of 888.

2. About 20.

3. Allerton and immediate vicinity.

4. About the same.

5. About the same.

6. Diphtheria.

7. Can not.

8. Can not state.

10. Diphtheria.

15. October and November, diphtheria.

16. Ten or twelves cases of diphtheria. There were a few cases of typhoid fever. 5 or 6.

17. Small-pox, cholera, scarlet fever, measles, whooping-cough, cerebro-spinal meningitis.

19. Never less hog cholera during the winter months.

24. About 25 feet.

Yours truly,

F. W. Flower, M. D.

Allerton, Wayne county, April 2, 1881.

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*The figures at the beginning of paragraphs refer to Circular 28B, on pages 75-77.

NORTHWESTERN DIVISION.*

REPLIES OF J. L. SUTHERLAND, M. D., OF NEWELL, BUENA VISTA COUNTY.

†1. Three hundred and sixty.

2. Three.

3. The eastern quarter of Buena Vista, the western quarter of Pocahontas and a small strip of the northeastern part of Sac county.

4. From what I can ascertain it was less *about* 2 per cent.

5. About the same.

6. Entero-colitis among infants and typho-malaria among adults.

7. Unusual drouth which, on account of swamps and basins in this locality, more decaying vegetation was exposed to the direct rays of the sun, with the usual results, and the water in the wells being quite low and lying in a strata of clay peculiar to the region, rendered very unfit for drinking and culinary uses.

8. Cannot say.

9. ....

10. I can say nothing more than is said in answer to 6 and 7.

14. From July 15th to September 1st, and only *comparatively* high.

15. As this is a newly settled country I don't think there was any new disease.

16. Small-pox, 0; cholera, 0; scarlet fever, 0; by pleuritic fever, 0; measles, *about* 12; whooping-cough, perhaps 30; cerebro-spinal meningitis, 0; dyphtheria, 0; entero-colitis seemed to be endemic; catarrhal laryngitis prevailed in vicinities, the former in the greater degree. Of the latter I don't know of a single fatal case.

17. Answered in 16.

18. *January* — Pneumonia, measles, and bronchitis, with a few mild cases of throat affections.

February—Principally the same, only in an intense degree.

March—A few cases of pleuritis with an unusual amount of renal congestion; don't know the cause, unless produced by malarial influence.

April—Erysipelas of the mild forms and but few cases.

May—Hepatic derangements with the usual complications.

June—But little sickness of any kind.

July—First part healthful, but toward the last cholera-morbus among adults; entero-colitis among children.

August—About the same as last of July.

September—About the same as preceding, but with diseases abating gradually.

October—Remittent and typho-malarial fevers, with increased mortality among adults, cause stated above.

November — Generally healthful; no cases of importance.

December — Very healthful; evidently from a steady, low temperature and a dry atmosphere.

19. Hog cholera, and among horses a recurrence of the epizootic, the former in July and August, the latter in November mostly; both in a mild degree.

20. Nothing unusual, except excessive high winds continuing several days in succession, and one severe hail-storm in July.

21. From June, 1879, to April 1880, there was but little rain-fall in this vicinity. The said moisture as follows: June, May, August, September, January, February, March, November, December, October, April, July.

22. June, May.

23. July, April, and the latter part of September, and first of October.

24. Ten to twenty-five feet in wells; streams, five to seven feet; variation is slight.

25. Couldn't say.

26. July.

27. June.

28. As before stated, this being a new country, there are not the conveniences here. Houses small; using same room for kitchen and sleeping apartments, there is necessarily great variations of temperature, uncleanliness of both body and domiciliary; too many occupying the same apartment, etc. These and many other kindred *causes*. As to communicability, that there is not sufficient opportunity for isolating the sick is a *very* prominent feature. By *enforced*

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*For counties comprising this division see page 79 and map.

†Figures preceding paragraphs refer to Circular 23B, on pages 75–77.

regulation of these last named items, there is no question but the sanitary condition would be greatly improved. Excuse the brevity of this, and next year I can furnish you with a more exact report as I shall collect and record facts.

J. L. SUTHERLAND, M. D.

Newell, Buena Vista county, April 18, 1881.

REPLIES OF THERON NICHOLS, OF FT. DODGE, WEBSTER COUNTY.

*1. Population, 3,580.

2. In the city, 35; in the country, 108.

3. City of Fort Dodge.

4. Rather diminished.

5. Less.

6. No disease was more than usually prevalent.

7. ....

8. No one can be particularized. It was a season of general health.

9. Lessened rain-fall and dryness of atmosphere in consequence.

10. None.

11. ....

12. None can be particularized.

13. ....

14. None.

15. None worthy of mention.

16. Typho-malarial fever, two; diphtheria, one; whooping-cough, one.

17. Small-pox, cholera, scarlet fever, measles, cerebro-spinal meningitis.

18. There was no epidemic diseases during the year; the mortality seems to have been quite freely distributed through the year.

19. The only prevailing disease was what is known as "hog cholera," which prevailed almost continually from about June till the close of the year. This was very fatal and prevailed in neighborhoods throughout this county (Webster), usually sweeping away from one-half to nearly the whole of each herd in which it broke out. The pecuniary loss to our farmers was very great.

20. The most noticeable feature was extreme dryness. There were but light rain-falls in the spring, and but two or three storms during the summer. Not enough rain fell before frost came to perceptibly raise the water in springs or wells. Probably not more than six or eight inches fell during the entire season.

21. The whole season was uniformly dry.

22. The whole season was dryer than 1879, which itself was usually dry. The season of 1878 was accompanied by *more* than the usual rain-fall.

23. ....

24. On the river-bottom (Des Moines River) three to ten feet; on the second level (sand and gravel subsoil) twenty to fifty feet; on the highest level (prairie surface) clay subsoil, ten to twenty feet.

25. The depth gradually increased with advance of season.

26. ....

27. All.

28. There is nothing to communicate of importance on account of general healthfulness of the season; as you are aware returns from physicians date from about July 1, 1880, and estimates are made on first six months of year.

Respectfully submitted.

T. NICHOLS, M. D.

Fort Dodge, Webster county, March 29, 1881.

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*Figures preceding paragraphs refer to Circular 23B, on pages 75-77.

WESTERN DIVISION.†

REPLIES OF A. V. BENEDICT, M. D., OF DENISON, CRAWFORD COUNTY.

*1. Of the incorporated town, 1,441.

2. Cannot say; unusually few.

3. An average of seven or eight miles each way from Denison.

4. *Much* less.

5. *Much* less.

6. None.

8. Diphtheria.

9. Do not know, unless a general cleaning up of yards and alleys.

16. Can learn of *no* cases of small-pox. cholera, cerebro-spinal meningitis; *very* little typhoid. if any; no measles; perhaps a few cases of diphtheria, and in the fall and early winter some whooping-cough.

17. Cannot say positive. See 16.

19. Some epizootic among the horses; cannot learn how much or at what time most prevalent.

21. *Very* dry all the season.

24. From twelve to fifty feet, as it is very rolling ground.

The answers to the questions are not as full as I wish, but I have been here only one month and have gathered my information by inquiry. Many of the questions I could not answer at all. Awaiting further communication, I remain,

Truly yours,

A. V. BENEDICT, M. D.

Denison, Crawford county, April 1, 1881.

REPLIES J. M. RENDLEMAN, M. D., OF EXIRA, AUDUBON COUNTY.

*1. Incorporated; population in July last, 604.

2. About twenty.

3. A radius of ten miles.

4. Very nearly the same.

5. Same as No. 4.

6. None.

7-8-9. Answered in No. 16.

10. None.

11. ....

12. Answered in No. 16.

13. ....

14. Rates of mortality about average.

15. No unusual diseases occurred.

16. There were about thirty cases each of whooping-cough and typho-malarial fever of average violence.

17. Small-pox, scarlet fever, cholera, measles, cerebro-spinal meningitis, diphtheria.

18. Averaged about the same during the year.

19. None.

20. January, February, and March, mild winter weather; not a great amount of snow or storms. April noted for unusual continued high winds. May, June, July and August, unusually dry and extremely hot part of the time. September and October, ordinarily cold. November and December, cold.

21. Don't know exactly. The summer months *unusually* dry—should say August and September the dryest.

22. August and September.

23. Neither.

24. Ten to sixty feet. The country is quite rolling; average thirty feet.

25. Can't tell.

26-27. Hard to tell; governed very much by rain-fall on high grounds, but on low ground not so preceptable.

28. Not prepared to answer.

Respectfully,

J. M. RENDLEMAN.

Exira, Audubon county, March 28, 1881.

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†For counties comprising this division, see page 79 and map.

*The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

REPLIES OF W. S. SCHERMERHORN, M. D., OF JEFFERSON, GREENE COUNTY.

*1. Jefferson; incorporated; 1,444.

2. Twenty.

3. Jefferson, Hardin township, one-half Bristol township, Jackson township, one-half Greenbrier township, one-half Franklin township, Grant township and Highland township, all in Greene county, Iowa.

4. Diminished about five per cent.

5. Diminished about ten per cent.

6. None.

7. ....

8. Malarial diseases and enteric.

9. Dryness of the season.

10. None.

11. ....

12. Enteric, particularly.

13. The extreme dryness of season.

14. In January, high rate of mortality; throughout the rest of the year, low.

15. In September and October a number of cases of diphtheria, which is a very rare disease with us.

16. Measles, perhaps 50; whooping-cough, two hundred; diphtheria, twenty; no others.

17. Small-pox, cholera, scarlet fever, typhoid fever, cerebro-spinal meningitis.

18. *January*—Erysipelas, enteritis.
February—Pneumonia.
March—Pneumonia.
April to September—No disease prominent.
September—Diphtheria and measles.
October—Measles and diphtheria.
November and December—No disease prominent.

19. September to December, a disease among hogs popularly called cholera; less of it, however, than usual.

20. Unable to do it satisfactorily.

21. September, August, October, June, July, March, February, May, April, January, November, December.

22. Every month in the year.

23. None.

24. Fifteen to twenty-five feet; pretty uniform in the entire district.

25. Cannot give particulars; the variation was perhaps five feet.

26. None.

27. All the year, but especially in March and September.

28. I have some facts on this subject which I shall be pleased to submit at an early day.

W. S. SCHERMERHORN, M. D.

Jefferson, Greene county, April 5, 1881.

REPLIES OF W. R. LEWIS, M. D., OF RIPPEY, GREENE COUNTY.

*1. Rippey; unincorporated; one hundred and ninety-two.

2. ....

3. The territory consists of Union township of Boone county, and Washington township of Greene county; there are probably 1,500 inhabitants in the territory.

4. Probably less by twenty-five per cent.

6. None.

7. ....

8. Measles, diphtheria, whooping-cough, diarrhœa of children, dysentery, remittent and intermittent fevers.

9. To the absence of extremes of heat and cold, and the absence of special causes.

10. None.

11. ....

12. From all.

13. To the mildness of the diseases.

14. No disease attended by a high rate. In December there occurred an epidemic of influenza, but was attended by a very low rate of mortality, no deaths occurring.

15. December, influenza.

16. Small-pox, none; cholera, none; scarlet fever, none; typhoid fever, one; measles, none; whooping-cough, none; cerebro-spinal meningitis, none; diphtheria, none.

17. Small-pox, scarlet fever, cholera, measles, whooping-cough, cerebro-spinal meningitis and diphtheria.

18. Cannot ascertain.

19. There occurred in March and April some cases of "strangles"; also, cases of inflammation of the bowels and colic among horses during the summer.

Typho-malarial fever prevailed to considerable extent during the months of November and December.

There were a few cases of lung fever. There are a few cases of farcy among horses.

Among cattle there were a few deaths

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*Figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

after they had been turned into the stock fields.

The only constant lesion, post-mortem, was a congested condition of the brain.

Some cases of cholera among hogs.

20. No records kept by anyone.

21. August, July, September, October, November, June, May, April, December, March, January, February.

22. September, August, July, October.

23. Not unusually moist.

24. Probably an average of ten feet.

25. Below the average from July during the remainder of the year.

26. Not unusually high during the year.

27. July, August, September, October, November and December.

28. A child who was said by the attending physician to have scarlet rash, and was devoid of danger, was allowed to leave home in the desquamative stage, and was allowed to mingle with its cousins, five of whom were seized on the eighth day with the initial symptoms of scarlatina, in all of whom it was of severe form, followed by renal troubles (dropsy, etc.,) in four, and ear trouble in one, which shows that a mild case may communicate a severe form of the disease.

I am indebted to Drs. Mower and Lovejoy, and J. B. Hall, V. S., for the foregoing information. Respectfully,

W. R. Lewis, M. D.

Rippey, Greene county, August 20, 1881.

REPLIES OF S. J. PATTERSON, M. D., OF DUNLAP, HARRISON COUNTY.

*1. One thousand, two hundred and sixty-four.

2. Fifteen or twenty.

3. Confined to Dunlap.

4. Slightly less than an average.

5. Same as No. 4.

6. None.

7. ....

8. Diphtheria has been less prevalent than for four years.

9. Cannot give any at present.

10. None.

11. ....

12. Same as No. 8.

13. ....

14. Had no particular epidemic.

15. Nothing new.

16. Cannot give the number of cases, but they have been very few.

17 Small-pox, cholera, cerebro-spinal meningitis.

18. Cannot give them.

19. The epizootic.

20. Cannot give an account by months, and cannot think of anything unusual except drouths. Had no rain of consequence during the year, and no snow in the early part of the year.

21. Refer to No. 20.

22. March, April and May.

23. See No. 20.

24. The wells are from thirty-five to sixty feet deep according to location in hollow or on hill.

25, 26, 28. The streams were all very low and some dry that were never known to be so before. They were probably lowest during September, October and August.

S. J. Patterson, M. D.

Dunlap, Harrison county.

REPLIES OF A. E. STEVENS, M. D., OF WALL LAKE, SAC COUNTY.

*1. Unincorporated; two hundred and eight.

2. The mortality was very small, there being but four deaths.

3. Sac and surrounding counties.

4. About the same.

5. About the same as previous.

6. Cholera infantum.

7. Prolonged hot weather caused that.

8 Diphtheria; and, in fact, all were less prevalent except the one named.

9. ....

10. From cholera infantum.

11. In all of the cases of death from that disease there was a peculiar heat or inflammation at the base of the brain.

12. Diphtheria and scarlet fever.

13. There were but very few cases.

14. From July 25th to October 15th.

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*The figures at the beginning of paragraphs refer to questions in Circular 28B, pages 75-77.

15. There was nothing unusual during the year.

16. Scarlet fever, one; whooping-cough, two; diphtheria, several; of the rest, not any appeared.

17. Small-pox, cholera, typhoid fever, cerebro-spinal meningitis.

18. Cholera infantum from July to October; the others were scattered all through that time.

19. Nothing but hog-cholera in the spring and summer.

20. Nothing unusual, except dryness.

21. They were about alike all through.

22. April, May and August.

23. There was no unusual moisture here at any time during the year.

24. About forty feet is the average.

25. There are no facts to note, only a gradual decrease of water all the year; old wells were made deeper, or new ones dug.

26. There is no comparison to be made.

27. June, July, August, September, October and November.

28. As for this, there are no facts to be stated. This question will be answered in different ways, but certain it is that persons seem to make a business of scattering carcasses of hogs that have died of cholera, especially in the vicinity of farms where there are known to be large droves of hogs. These persons are renderers of lard, or soap-makers, etc. People should be compelled to bury out of sight the carcasses of all animals that may die on their premises. For example: the Boyer River no doubt washed hundreds of dead bodies down to the Missouri River with the spring freshet which had been thrown into it to get rid of them. You can readily see the evil that may result from this to the warmer countries south of here. It should be prohibited by law.

Yours, with respect,

A. E. STEVENS, M. D.

Wall Lake, Sac county, April 14, 1881.

REPLIES OF ALLEN A. RAWSON, M. D., OF CORNING, ADAMS COUNTY.

*1. Incorporated town; population, June, 1880, 1,522, adding one mile in vicinity about total, 1,675.

2. Ten.

3. Town and one mile in vicinity. See No. 1.

4. The average (opinion).

5. Same as No. 4.

6. None.

7. See No. 18 below.

8. Infantile diseases slightly less.

9. Generally even temperature and moderate rain-fall.

10. None.

11. None.

12. See No. 8.

13. See No. 9.

14. No date—did not exist. See No. 4.

15. None but ordinary diseases, except as in No. 16.

16. Two cases scarlet fever in March—one case typhoid fever in August, and few scattering cases of pertussis.

17. Only as in No. 16.

18. December—influenza, acute catarrh, coryza.

19. Hog cholera, moderate extent; epizootic or distemper in horses; extensive but in average mild form in December.

20. January, February, March mild, quite moist; April and May, high, warm winds with vast clouds of dust and removal of earth, often making drifts from one to four feet deep; June, July, August, dry with light showers, except as in No. 23; September cool with frequent rain (see No. 23); October, dry and cold with warm sunshine; November, dry, opening cold, becoming very cold and freezing from 10th, increasing to 30th, and ground frozen solid for rest of year; December, cold, loaded with moisture and fog with scarcely sunshine.

21. See No. 20; soil corresponded with weather.

22. April, May and June.

23. Last half of August and first half of September.

24. Twenty-five feet; no great variation.

25. Varies from fourteen feet in spring months to thirty feet in September.

26. No obvious difference.

27. From January to middle of August.

28. See No. 18; ceased promptly upon recurrence of dry, cold weather.

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* The figures at the beginning of paragraphs refer to Circular 23B, on pages 75-77.

Few cases of typhoid fever and diphtheria said to exist in Adams county at large, but in general the foregoing answers fairly for the county doing 1880.

I am respectfully,

ALLEN A. RAWSON, M. D.

Corning, Adams county, March 29, 1881.

REPLIES OF E. E. MAJOR, M. D., OF ANITA, CASS COUNTY.

*1. Five hundred.

2. About thirty.

3. A radius of about four miles, *i. e.*, a distance in all directions from Anita of four miles.

4. About the same as the average, though less than in 1878 and 1879, owing to epidemics of diphtheria in those years.

5. Same as for No. 4.

6. None.

7-8-9-10-11-12-13-14. None.

15. None.

16. Small-pox, none; cholera, none; scarlet fever, typhoid fever and measles, a limited number of cases of each disease; whooping-cough, quite prevalent in latter months of 1880, and continuing to date March, 1881; cerebro-spinal meningitis, none; diphtheria, a few light cases.

17. Small-pox, cholera, cerebro-spinal meningitis.

18. ....

19. Have heard of no prevalent diseases among animals save occasional outbreaks of "cholera" among swine, mostly in the spring and fall.

20. No characters of weather noted.

24. Unusual depth to water in wells, twenty feet to thirty-five feet.

I have found myself unable to answer satisfactorily to myself a large number of your questions, and thought best to leave them blank.

Hoping to be able to answer in better and more positive manner your succeeding lists, and trusting this may not be wholly without value. I am,

Yours very truly,

E. E. MAJOR, M. D.

Anita, Cass county, March 25, 1881.

REPLIES OF L. M. ANDREWS, M. D., OF LEWIS, CASS COUNTY.

*1. Population, four hundred and seventy-nine.

2. Only three deaths from all causes during the year.

3. The territory with which I am most conversant is Cass township; south part of Washington and Atlantic; west part of Bear Grove; northwest part of Noble, and north part of Pleasant townships, all in Cass county; also, the east part of Wright township, in Pottawattamie county, embracing a territory of ten or twelve miles.

4. Disease has been on an average with other years.

5. About the same as the average.

6. Diphtheria.

7. Cannot say positively, but as near as I can ascertain, the above was caused from drinking unhealthy water, and some from extreme uncleanliness. One family had two cases of diphtheria, one fatal. Everything was in perfect order, but they lived on a newly-broken piece of land. I could not attribute any cause for the trouble. I was confined to this locality.

8. ....

9. ....

10. ....

11. I cannot, except what is stated above.

12. ....

13. ....

14. ....

15. ....

16. Cannot give the exact number of cases. Scarlet fever complicated with diphtheria, ten to fifteen, all in one locality; typhoid fever, only three cases; measles, sixteen or seventeen cases; diphtheria, uncomplicated, seven.

17. Small-pox, cholera, whooping-cough, cerebro-spinal meningitis.

18. November and December the most prevalent was diphtheria, and, also, in July and August; measles in March and April.

19. No disease appeared among the animals last year.

20. No meteorological phenomena occurred that I can recollect, but a cyclone, very destructive to animals and property, which occurred on the evening of

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*The figures beginning each paragraph refer to questions in Circular 23B, on pages 75-77.

June 8th, coming from southwest and going northeast.

21. There was but little difference as to moisture during the year.

22. If there was any difference, it was the dryest in August.

23. No month. All were dryer than previous years.

24. From fifteen to seventy feet.

The last few questions I cannot answer. In spring months the ground water would be nearer the surface, as a general rule, than later in the season; but the year 1880 was an exception to all previous years, as the ground water was farther from the surface during the whole year.

Yours respectfully,

L. M. ANDREWS, M. D.

Lewis, Cass county, April 15, 1881.

REPLIES OF T. D. ROOD, M. D., OF ANITA, CASS COUNTY.

*1. Incorporated. Population, four hundred and seventy-nine.

2. Seven.

3. Anita and vicinity, a radius of six to ten miles.

4. Less, I should judge, by thirty-three and one-third per cent.

5. About the same.

6. Diphtheria more than average, but not so great as in 1879.

7. Perhaps the lingering influence of the epidemic of diphtheria prevailing late in the year 1879.

8. ....

9. ....

10. ....

11. ....

12. ....

13. ....

14. April, May and June, diphtheria, high; May and Jue, scarlatina, low.

15. July, August and September, influenza, rheumatism and typho-bilious fever.

16. Scarlet fever, twelve; typhoid (bilious), twenty-five; diphtheria, twenty or thirty; measles, 1 (estimated).

17. Small-pox, cholera, whooping-cough, cerebro-spinal meningitis.

18. *July, August, September and October*—Typho-bilious fever.
April, May and June—Diphtheria.
May and June—Scarlet fever.

19. Cholera among hogs from August to December. Epizootic, or influenza, among horses in December.

20. ....

21. May, June, July, August and December, wet; September, October and November, wet.

22. May, June, July.

23. September, October, November.

24. On rolling prairie, twenty-five to thirty-five feet; on bottom land, twenty to twenty-five feet.

25. Difficult to answer. During July and August many wells were dry throughout the country, but the largest creeks all had running water.

26. Cannot say that it was at any time.

27. May, June, July and August.

28. Diphtheria started in one family (Germans) where the house was built over a hole dug in the ground, and used as a cellar, with no drainage from it, or ventilation under the house. Water had stood in the cellar, and as the dry weather came on, settled away into the ground. The trap door being raised, used for the purpose of entering the cellar, created a terrible smell of badness.

The form of typhoid fever mentioned above, mostly occurred within the corporation, and was no doubt caused by exposed privies, and many of them in close proximity to the wells from which water is used for drinking purposes.

Suggestions, though of doubtful practicability: Compel every person to see that cleanliness exists in both front and back yards of premises; that no water from the top of the ground enters directly into a well used for drinking purposes; that no privy in town be built or used without cemented vault, and the same be thoroughly cleaned at least twice a year; that the manure from all stables be removed at least every two weeks in the summer time; that hen-houses be kept clean; that cellars be looked after in town and country; that vegetables be not stowed away in house cellars for winter keeping. I believe much sickness can be prevented by cleanliness, good ventilation, pure water, etc.

Yours truly,

T. D. ROOD, M. D.

Anita, Cass county, March 30, 1881.

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* The figures at the beginning of paragraphs refer to Circular 23B, pages 75-77.

REPLIES OF R. R. HANLEY, OF SIDNEY, FREMONT COUNTY.

*1. Sidney; incorporated town; population 855; the civil township contains 2,994.

2, 3. The mortality was unusually small, not over one per cent in town and township.

4. One-third less than average.

5. The ratio of deaths less by 50 per cent.

8. Intermittent fevers, remittent, typhoid and dysentery were less than usually prevalent.

9. Less, on account of copious rains in the hot months, causing less deleterious exhalations.

10. Not any.

11. Same as No. 10.

12. From those named above.

13. Equable temperature.

14. Diphtheria, scarlet fever, cholera infantum.

15. Epizootic of animals in the month of December.

18. There was very small prevalence of any one disease above others occurring in this township.

19. Epizootic in the early winter.

20. The rain-fall of January, February, March and April was very light, and the weather mild and pleasant. The hot months, up even to frost, had plenty of rain, and a thrifty and long growth of vegetation; November and December were winter months of steady and moderately severe cold weather.

21. The soil moisture in this locality I can give no better than by the rain-fall. The months in order of dryness to wetness are February, January, March, April, November, December, June, July, August, October, September, May.

22. The dryness was greatest the first four months; the wettest the next four months.

24. Our land is much of it rough, rolling prairie and timber land; and much of it flat bottom-lands of the Missouri and Nishnabotna rivers. The uplands vary in depth to water from 50 to 90 feet; on the bottoms from 15 to 35 feet.

25. The variation is but small in this region; I can not state definite.

26, 27. Water was low, the first four months; highest the succeeding eight months.

28. To improve health conditions, I regard the regulations of the State Board as of the first value in respect to cess-pool, privy and stock yard drainage; next the ventilation and temperature of school rooms and churches, lecture-rooms, etc. I would commend to your favor the proper encouragement of training schools for nurses and the more extended and correct ideas of hygiene in the treatment of incipient disease. I would be glad to give you more exact information, but I have given you the best I can for the present time.

Respectfully,

R. R. Hanley, M. D.

Sidney, Fremont county, April 19, 1881.

REPLIES OF O. W. ARCHIBALD, M. D., OF IOWA ASYLUM FOR FEEBLE MINDED CHILDREN, AT GLENWOOD, MILLS COUNTY.

*1. City of Glenwood, 1,791.

2. About 10.

3. Town of Glenwood for 1,800 people.

4. Diminished about 10 per cent.

5. Less 10 per cent.

6. Typho-malarial fever, meningitis, and perhaps mild cases of diphtheria.

7. Cannot; unless the unusual dryness of the season and low water indicates.

8. Cholera infantum and dysentery in children.

9. Don't know; excepting climate seemed more even and nights not so cold.

10. Typho-malarial fever and three cases of diphtheria.

11. The nervous system of patients with fevers seemed to be greatly poisoned and protracted at the beginning of the disease; caused undoubtedly from the unusual severity of the malarial poison or the impurity of water or effects of ice, sewerage and ventilation of apartments, etc.

12. Answered in No. 8.

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*The figures at the beginning of paragraphs refer to Circular 23B on pages 75-77.

13. See No. 9.

14. High in September and November.

15. Diphtheria in September October, and November.

16. Typhoid fever, 6; diphtheria, 12; meningitis, 5.

17. Small-pox, cholera, scarlet fever, measles, whooping-cough, cerebro-spinal meningitis.

18. Typho-malarial fever, diphtheria, cholera infantum.

19. In October several horses died from epizootic or a similar disorder, and many were diseased during October and November.

20. ....

21. March, April. June, September, October, November, July, August, February January, December, May.

22. April, May, June, and September.

23. August and July.

24. Varies from 8 to 150 feet. The great difference depends upon the high prairies adjoining the low bottoms of the Missouri, and other creeks in the neighborhood.

25. It would vary from 3 to 12 feet.

26. July.

27. September and October.

I have answered the questions as near correct as possible from my own observation, and what I can obtain from the other physicians in the town. The year 1880 has been unusual in regard to the nature of diseases in this particular locality. There have been less cases of sickness and fewer deaths. But all cases seemed to be of a more severe type and lingered longer than is common. It has seemed to me for a long time that a great deal of sickness in our smaller towns originates from the carelessness of people in regard to out-houses. I presume our town is no exception, and I am sure that two-thirds of the privies are filled level with the surface of the ground and during both the rainy season and the excessive hot days of July and August the influences of this nuisance must be anything but healthful to the inhabitants. But for fear you think me suggesting an evil that to my mind ought to be overcome in every locality, and with which you are perfectly familiar, I will close. I only wish I could be of some service to your honorable body and to the people generally in this important matter.

Very respectfully,

O. W. ARCHIBALD, M. D.

Glenwood, Mills county, May 5, 1881.

REPLIES OF F. M. POWELL, M. D., OF HASTINGS, MILLS COUNTY.

The following is a report from memory for the year 1880:

*1. Incorporated town; number of inhabitants four huudred and fifty.

2. Six.

3. Town of Hastings, eight to ten miles north and south on the bottoms of West Nishnabotna River; east and west two to three miles along the uplands.

4. A little less than usual.

5. The ratio of deaths a little less than previous.

6. ....

7. ....

8. Malarial and summer complaints, were less than usual.

9. There was not the amount of moisture in the bottoms; the ponds and morasses were dry throughout the season.

10. ....

11. ....

12. Malarial and summer complaints.

13. To the moderate amount of moisture in the atmosphere and even temperature of the season.

14. ....

15. ....

16. I have no record; had no cases of small-pox or cholera; of scarlet fever, a few cases of a mild type; typhoid fever, probably a dozen cases during the year, including typho-malaria; measles, but few cases; about twenty cases of diphtheria; one sporadic case of cerebro-spinal meningitis.

17. Small-pox and cholera.

18. *January* and *February*—Catarrhal lung fever.
July and *August*—Summer complaint.
August and *September*—Malarial fevers.

19. ....

20. ....

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*The figures at the beginning of paragraphs refer to Circular 23B, on pages 75–77.

21. Have no record.
22. ....
23. ....
24. Bottom-lands sixteen to twenty-five feet.
25, 26, 27, 28. Cannot answer.

We promise you a fuller report for the year 1881.

Yours truly,

F. M. Powell, M. D.

Hastings, Mills county, May 28, 1881.

REPLIES OF C. DEETKIN, M. D., OF COUNCIL BLUFFS, POTTAWATTAMIE COUNTY.

*1. Eighteen thousand and fifty-nine.
2. No record; about four hundred.
3. Council Bluffs, Iowa; four miles square, about.
4. About the same.
5. Average.
6. Diphtheria.
7. Cannot assign any cause.
8. None.
9. ....
10. No unusual mortality, diphtheria excepted.
11. Cannot answer.
12. Average mortality.
13. ....
14. Diphtheria, and especially diphtheretic croup, come on always with a raw, cold spell of weather.
16. No small-pox; no cholera; twenty-five scarlet fever; fifty typhoid fever; fifty measles; no whooping-cough; no cerebro-spinal meningitis; two hundred diphtheria (opinion); and many (hundreds) malarial diseases.
17. Small-pox, cholera, cerebro-spinal meningitis.
18. *July* and *August*—Diarrhœal diseases.
September—Malarial diseases.
November—Typhoid fever.
December, January, February, March—Diphtheria.
19. A disease among hogs, called hog cholera; as far as I can understand, something like a typhoid fever; and another disease commencing with swelling of throat and a peculiar paralysis of the limbs, similar to diphtheria.
20. Dry up to May.
21. April very dry.
22. March, April and part of May.
23. None.
24 Eighteen to twenty-two feet in Missouri bottom.
25. ....
26. None.
27. Spring.
28. ....

I am in the habit to smoke my own house from cellar up, monthly, with sulphur, and also every house wherever I find typhoid fever, or especially diphtheria, and have reason to think it prevents spreading of the above mentioned diseases distinctly.

C. Deetkin, M. D.

Council Bluffs, Pottawattamie county, March 26, 1881.

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*The numbers at the beginning of paragraphs refer to questions in Circular 23B, pages 75-77.

REPLIES OF THOMAS B. LACEY, M. D., OF COUNCIL BLUFFS, POTTAWATTAMIE COUNTY.

*1. Eighteen thousand and fifty-nine.

2. City and county about 300; city 225.

3. Council Bluffs and Pottawattamie when so specified.

4. About the same average as with previous years; certainly no increased per cent.

5. Same answer as to question 4.

6. None; we had no epidemic of any kind.

7. ....

8. There is no data upon which to base a definite reply. In my opinion there was no disease or cause of death perceptibly less prevalent except "found dead," and unknown causes.

9. Morals, and law, and order.

10. I should judge that there was no increased mortality in proportion to the population.

11. None.

12. None.

13. ....

14. Am unable to answer.

15. None.

16. In city and county as per answer to question No. 3. Deaths only: Scarlet fever two; typhoid fever, about fifteen; measles, two, if my memory serves me right; whooping-cough, four or five in infants; cerebro-spinal meningitis, one, I think; diphtheria, twelve or thirteen, as reported between August 1, 1880, and January 1, 1881; am unable to give whole number of cases.

17. Small-pox and cholera, and no case of cerebro-spinal meningitis in city corporation.

18. Am unable to answer this question.

19. In September, October, and November several cases of epizootic among horses, and in the summer chicken cholera among poultry.

20. Cannot answer.

21. I should say from my own observation, August, September, July, October, June, and November were the driest in the order mentioned, and that January, February, March, April, May, and December would average about alike, with May, perhaps, a little dryer than the others.

22 During the months mentioned as the driest in answer to the 21st question.

23. I believe none.

24. Fifteen to eighteen feet; you will bear in mind that the principal part of our city is located on the bottom-land. Water can be reached in some localities at a depth of eight to twelve feet; but fifteen to eighteen feet will be the average for wells.

25. Have made no observations upon which to base an opinion even.

26. March, April, May, and December.

27. June, July, August, September, and October.

28. During the year two cases of sudden death in children were reported to our local medical society by Dr. H. W. Hart, which from the symptoms he was of the opinion they were cases of stramonium poisoning, the poison believed to have been conveyed through the milk of cows having eaten the stramonium while grazing. Both cases were in the same family, and both died within three or four hours of each other, and neither of them living more than twenty-four hours after showing first symptoms. There was no *post-mortem* or other examination, so that there was nothing absolute in regard to the case. Dr. Donelan of Glenwood reported having personal experience with similar trouble in his own family, and he believed from a similar source—no deaths, however.

Yours respectfully,

THOS. B. LACEY, M. D.

Council Bluffs, Pottawattamie county, April 17, 1881.

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*The figures at the beginning of paragraphs refer to questions in Circular 23B, on pages 75-77.

LEGISLATIVE RECOMMENDATIONS.

Practical experience has demonstrated that chapter 151, laws of 1880, is very defective, and requires an important amendment to accomplish the intent of the framers of the law, and the object of the State Board.

The returns received at this office from the clerks of the district and Circuit Courts, give abundant evidence that physicians and those who solemnize marriages, neglect to observe the laws in making returns of their doings to the clerk as required by section five. For such violation, the clerk is authorized to bring an action for the recovery of the penalty provided, but he must do so at his own cost. Inasmuch as the fines and penalties recovered go into the county treasury, the county becomes the beneficiary of the recovery. This section should be so amended as to require the county or district attorney to prosecute without delay, to a final hearing, in the name of the State, on complaint of the clerk of the courts, all actions, under this section.

The value of vital statistics is in their completeness.

It is a common, I may say prevalent, impression, that vital statistics are of but little use, except to physicians and insurance companies. It seems strange that the eminently practical American mind which is so largely moved by pecuniary motives, does not readily discover the great importance of a full collection of the very few particulars of the three great events in human life—birth, marriage, and death.

The advantages to be derived from a registration of vital statistics may be briefly enumerated; to-wit,

1. Furnishing a reliable record of facts, which are frequently necessary in establishing right to, and the distribution of property.

2. Aiding in the detection of crime.

3. Determining the social condition of the people, and the influences which control the gradations in society.

4. In ascertaining the sickness and mortality, with reference to causes, and comparative prevalence in localities; and in furnishing the means to discover the influences which conduce to the prevalence, as well as the means of controlling them. Prevention is easier than cure. The arguments are unlimited which might be adduced to show

that the people of Iowa are interested in wealth, as well as health, in the full and complete execution of the law relating to vital statistics; and that clergymen, physicians, midwives, coroners, and all others who have duties under the law to perform, shall fully comply therewith.

Considerable controversy has arisen in various cities and towns, as to the proper construction of section thirteen. Whether or not the mayor and entire council of a city and town were necessary to constitute the board of health of such city or town, or whether or not a portion of the council may constitute such board? The statutes of Iowa nowhere recognize such an officer as "alderman." I would suggest that the word "council" be substituted in line one, section thirteen, for the word "aldermen," and that after the word "shall," in the third line, the words "*shall constitute the board of health, and shall*" be inserted.

Section fourteen requires the appointment of a physician as health officer. No definite time is fixed for such appointment, and the returns from clerks and health physicians indicate that the requirement is largely neglected. I would suggest that this section be amended by inserting after the word "appoint," in the first line, the words, "*and constantly have,*" and insert after the word "jurisdiction," in the third line, the words, "*and an executive officer of the board.*" There is an imperative necessity for this provision in order that regulations restricting contagious diseases by local boards may be enforced by a proper person. At the end of the section add the following:

"*Within thirty days after the annual meeting of the trustees, in each year, the board of health shall meet for the transaction of business, and shall appoint, or re-appoint a health physician, and the clerk of the board shall immediately transmit to the Secretary of the State Board of Health, at Des Moines, the name and post-office address of such health officer. A special meeting of the board may be called by the order of the president, or of any two members of the board.*"

Under section fifteen, health physicians and clerks of local boards are required to return to this office, all cases of contagious or infectious diseases occurring within their jurisdiction. A very important provision is entirely omitted from the law. It is not made the duty of any person to furnish the facts upon which these reports can be made. The State Board sought to remedy the defect by adopting the following rules, which were printed in the circulars on small-pox, diphtheria, and scarlet fever. (See pages 28, 32, 36).

Whenever any *householder* shall know that any person within his family is taken sick with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, he shall immediately *give notice thereof to the board of health*, or to the *health officer* of the township (city or town) in which he resides; and if he shall refuse or neglect to give such notice, he shall forfeit a sum not exceeding one hundred dollars.

Whenever any *physician* shall know that any person whom he is called to visit is infected with the small-pox, scarlet fever, diphtheria, *or any other disease dangerous to the public health*, such physician shall immediately *give notice* thereof to the board of health or health officer of the township (city or town) in which such diseased person may be; and every physician who shall refuse or neglect to give such notice, shall forfeit, for each offense, a sum not less than fifty nor more than one hundred dollars.

In order that the guardians of the public health may have early warning of the presence of contagious or infectious diseases, it is important that prompt notice be given thereof.

Nine-tenths of the reports from clerks of local boards, and that where contagious diseases are known to have been prevalent, come to this office inscribed, "no cases of contagious diseases reported to me," evidencing clearly that physicians and householders take cover under the omission of statutory provision to defeat a very important object of the State Board of Health. These requirements should be engrafted on the statute, and the penalty made ample to insure obedience. The safety of a community from the ravages of an epidemic disease depends upon the prompt application of restrictive measures. The physician and householder are the first to be apprised of the presence of a contagious disease, hence, it should be made their duty to act promptly for the protection of the community. From the hazard, and the risk to human life involved, a violation of these requirements should be made a misdemeanor.

Under the provisions of section five, all physicians and midwives in this State are required to register their names with the clerk of the District and Circuit Courts of the county where they reside. No penalty is attached for neglect to do so, hence, I am informed by clerks of the courts that this requirement is largely ignored by physicians and midwives. A full compliance with this statute would afford the clerks some means of determining whether or not physicians and midwives made returns of births and deaths occurring under their supervision. As the statute now is, it is only necessary to abstain from registration to secure exemption from operation of the law.

During the past year a question of considerable importance arose in several counties, among physicians and clerks of the courts. Where a physician practices in one or more counties, and he is registered only in the county where he resides, the question arises whether or not he should make return of births and deaths coming under his supervision to the clerk of the county wherein he resides, or to the clerk of the county wherein the fact occurred. The object and intent of the law is to secure vital statistics for each county in the State. The presumption is, that the returns should be made to the clerk of the county wherein the birth or death occurred. The question was referred to the Attorney-general in 1880, and again to his successor in January, 1881. Their opinions were directly contradictory. In view of this evident ambiguity of the statute, some modification should be made to cure the defect.

The Secretary of the State Board of Health is required by section eleven to submit to the Governor, on or before December 1st of each year preceding the meeting of the General Assembly, a biennial report. Under section 1, chapter 159, laws of 1876, the executive department requires a duplicate copy of this report to be filed in the office of the Governor, on or before November 1st. Under section 24, chapter 151, laws of 1880, clerks of local boards are not required to report to the State Board until November 15; and under section three, clerks of the District and Circuit Courts are required to report October 1st. The necessary delay in transmission, and frequent neglect of clerks, renders it impossible for the Secretary of the State Board to compile a report at the date fixed by the provision of chapter 159, laws of 1876. These discrepancies and conflicts should be harmonized, and the fiscal year for reports of clerks of the courts and clerks of local boards should close at the same date.

No provision is made in chapter 151, laws of 1880, nor in the Code of 1873, for compensation of members of a board of health of an incorporated city or town. While section 505, of the Code, provides compensation for members of the council of a city or town, acting for the city or town in its corporate capacity, it is doubtful if this section would apply to members of a board of health, created under a different statute, and whose acts and services are not those of the municipal corporation of which they are the officers, *per se*. They are entirely distinct from those of a council. The doctrine laid down by the Supreme Court in *Larkin Upton v. County of Clinton,* 52 Iowa, 311, would preclude such local boards from compensation under the provisions of section 505, the court holding that the right to compensation by an officer, exists only by virtue of express statutes.

There is but one penalty provided in chapter 151, laws or 1880, which would come within the criminal law. All others are forfeitures, recoverable only by civil action. Much complaint has been made to this office of the inadequacy of the law in this regard to secure compliance with the rules and orders made by local boards. Ill favored and irresponsible persons disobey and set at naught such rules with perfect indifference, as a money judgment in court against them is valueless. To meet this objection, which practical experience has proved a serious one, it would seem advisable that section 419, of the Code, be revived, and chapter 151 be harmonized therewith.

During the past year notice was given this office, and the same was observed by newspapers in different localities, that agents were going about the State offering for sale to millers formulas for a compound to change the appearance of low grade flour so as to give it the character of a higher and better grade. The adulteration of food is practiced to an alarming extent, and extreme measures should be provided to protect the lives and health of the people therefrom. Section 4036 of the Code of 1873, should be so amended as to punish the sale, or offering for sale, any formula for, or any mixture or compound to adulterate food.

Glanders among horses has made its apperance extensively over the State, and in view of its communicability to man, and its almost absolute fatality, more extended legislation is necessary to give local boards of health power to restrict it, and dispose of diseased animals. The present statutes are inadequate to that end. Attention is directed to a special paper on that subject in another part of this report.

The statute now gives the State Board of Health only directory, or advisory power. Practical experience has demonstrated the necessity for giving the rules and orders of the State Board mandatory power, with statutory force and effect.

Contingencies have arisen, and will arise, where local influences prevent the operation of the health laws for the protection of the people. Authority should rest somewhere in such cases, to secure to communities the full benefit of the law, and nowhere could it be vested with more impartial judgment than with the State Board of Health, composed, as it is, of representatives from different parts of the State.

One of the most important subjects which come within the jurisdiction of boards of health is that of nuisances. These boards are now authorized to make such regulations respecting nuisances, within the limits of their jurisdiction, as they may deem necessary for the preservation of public health. They may order the same abated, but it must first be conclusively shown that they are nuisances in fact, and this can only be, as I understand the statute, by a court of competent jurisdiction. Slaughter-houses are considered by the courts as *prima facie* nuisances, and so of many other kinds of business, trade, and manufactures, yet a person engaged in them cannot be compelled to discontinue that business upon the judgment of any tribunal other than that of a court. Provision should be made whereby the carrying on of any business or trade which is injurious to the public health may be prohibited or restrained by boards of health. The parties so prohibited or restrained should have the right of appeal from orders of prohibition made by such boards, to a court of competent jurisdiction, where the question may be determined by a jury. Pending the appeal, the orders of the board should be in full force and effect.

Provision should also be made whereby, in every incorporated city or town or township, written consent or permission shall first be obtained of the mayor and council, or the trustees of a township, to erect, occupy, or use any building or premises for the purpose of carrying on therein the business of slaughtering animals, or for melting or rendering fat, lard, or other substance, or for any obnoxious trade or occupation whatsoever. And the neglect to obtain such consent or permit should make such person liable to a fine for each day such premises or building are used without a permit. The State Board of health should be granted authority, if in their judgment the public health or comfort, and convenience require it, to order any person, or persons, or corporation carrying on such trades or occupations, to desist or cease from carrying on such business or occupation, after being so ordered by the State Board of Health, under a penalty for refusal to obey such order: *provided,* that on any application for said Board to exercise the powers granted, a time and place should be assigned by the Board for a full hearing of the case; and no order should be issued by the Board until such hearing is had. Nothing therein should conflict with the powers granted to local boards, or with powers of courts to issue injunctions.

The statute recognizes the office of health physician of a local board of health, but he has no executive power. It seems to be imperative that the medical and sanitary officer of a board of health be given power to enter upon and inspect premises where the existence of a nuisance is suspected.

If courts were always in session, so that the question of a nuisance could be speedily determined, the case would be different, but they are not. Emergencies often exist requiring prompt and immediate action to protect the public health. Boards of health should therefore have the power to restrain persons from maintaining a nuisance until a hearing can be had before a court. Such is the law in Massachusetts, and the Supreme Court of that State has confirmed the action of boards of health under the statute granting such powers.

The great danger to which the state of Iowa is now exposed from the introduction of *pleuro-pneumonia* among cattle, and the consequent pecuniary loss, as well as the influence upon the health of consumers of meat, suggest that rigid and restrictive measures be adopted. To this end the statutes of Massachusetts are probably the most effective of any in force in the United States. It is verily a pestilence which *walketh in darkness.* It is well known the improvement of our native herds of cattle is made largely with animals taken from Eastern herds. One animal from an infected district, or infected in a stock-yard, or railroad car, may be brought to this State and mingle with a native herd for a month before the infection in the imported animal is even suspected. Once rooted upon the stock ranges of the West the result would be disastrous. It is a danger which threatens all classes alike, the stock owner and the consumer.

Section three requires that clerks of the District and Circuit Courts shall keep a record of all births, marriages, and deaths, and report the same to the State Board of Health on the 1st day of October in each year, and at such other times as the Board may require. This is the imposition of a new and often laborious duty upon clerks, for which no compensation is allowed. It is but justice and equity that some compensation be fixed by statute for the rendering of such service. These reports to the State Board are required to be made at a specified time under the liability of a penalty for neglect; and it is largely the rule throughout the State that the compilation of these reports must be made during the terms of the District or Circuit Courts, when the duties of the clerks require their presence in court, hence necessitating the employment of extra clerical labor to comply with the requirements of Sec. 13.

There is no provision in chapter 151, laws of 1880, made for a penalty for fraudulent or false statements relating to births, marriages, and deaths. This is an omission which should be corrected. There are on file in this office, reported facts showing the necessity for legislative action. I would suggest that section six be amended by inserting after the word "act," in the eighth line, the following words:

"Any person who shall knowingly make any false certificate, statement, return, or receipt, relative to any birth, marriage, death, or still-birth, under the provisions of this chapter, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine of not less than ——— dollars, nor more than ——— dollars, or by imprisonment in the county jail not less than —— days, nor more than —— days, or by both fine and imprisonment, at the discretion of the court."

In other States instances are on record where attempts were made to secrete the crime of abortion, by false certificates as to cause of death. This is a strong reason for this provision in the law.

Section 3, chapter 159, laws of 1876, provides for the printing and distribution of reports of the various State institutions. The State Board of Health has been created since the enactment of this law. Its provisions are not applicable to the State Board of Health. But thirty-five hundred copies of the report of the State Board can be printed under the law of 1876. Of that number one thousand copies are to be distributed to members of the legislature, twelve hundred copies are to be bound with other public documents, and five hundred copies distributed for miscellaneous purposes, leaving but eight hundred copies for the use of the State Board. It is decidedly important that every local board of health in the State, and health officers of each local board be furnished a copy of this report, as it contains the rules, regulations and all action, and decisions of the State Board, relative to matters coming within the purview of the health law of the State. There are nearly sixteen hundred township boards of health, and nearly four hundred boards of incorporated cities and towns. Chapter 159, laws of 1876, should be amended so as to provide for the printing of five thousand copies of the report of the State Board of Health, and that all copies in excess of the twenty-seven hundred shall be delivered to the State Board of Health; and said Board should be required to furnish one copy to the clerk of each incorporated city and town, and the clerk of each township; and one copy to the health physician of each local board of health, the same to be delivered to their successor at the expiration of their term of office.

FINANCIAL STATEMENT.

The following is a statement of expenditures by the State Board of Health from the fifth day of May, 1880 to September 30, 1881, showing for what purpose, to whom paid, and the number of the vouchers on which the same was paid. The vouchers were audited by the Board, and by the President, in accordance with sections 10 and 12, chapter 151, laws of 1880, and duplicates of all vouchers have been paid by the State Treasurer, on warrants drawn by the Auditor of State:

FINANCIAL STATEMENT.

DATE.		Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1880.				
June	16	1	*Mills & Company.*	
			1 8-quire record	$ 18.00
			200 circulars, ½ letter	4.00
			200 circulars, ½ note	2.00
			2,000 manilla envelopes, No. 6	4.00
			1 seal	4.00
			Printing 2,000 envelopes	3.00
			500 envelopes, No. 6½	3.00
			500 manilla envelopes, No. 11	4.00
			2 reams lithograph letter-heads. (Secretary)	14.00
			1 ream lithograph letter heads (President)	7.00
			3,000 circulars, Form 3B	5.00
			5,000 circulars, Form 7A	11.00
			200 Form 16, index to register of births	2.75
			200 Form 17, index to register of deaths	2.75
			150 circulars to clerks	2.00
			200 Form 14, register of physicians and midwives	4.00
			200 Form 13, register of deaths	4.00
			200 Form 12, register of births	4.00
			200 Form 1S, register of marriages	4.00
			200 Form 19, register of health officers	3.25
			200 sample books. Forms 4 and 3	10.00
			200 sample books, Form 1	6.00
			200 sample books, Form 2	8.00
			150 sample books, Form 5	6.00
			200 Form 19, register of still-birth	4.00
			1 6-quire expense record	14.00
			4 reams letter-head (members of the board)	28.00
			1 4-quire record of health officers	6.00
			1 8-quire record of distribution	11.50
June	17	2	*Mills & Abdill.*	
			1 ruling pen, 85c; inkstand, $2.25, mucilage stand,	5.60
			$2.50 2 paper weights, $1.30; 4 inkstands, $3; copy press $13.50	17.80
			1 letter book, $4.50; brush 50c., water cup, 75c	6.20
			4 rubber pad, $1,40: 4 sheets blotting paper, 60c	2.00
			2 blank books (D. and L.)	2.40
			1 letter scale	12.00
June	17	3	*Iowa State Register.*	
			200 circulars, Form 4B	1.75
			12 stair cards	1.25
			2.000 circulars, Form 6B	7.50
			1,000 blanks, Form 2C	10.50
			1,000 blanks, Form 1C	7.50
			1,000 blanks, Form 8B (health physicians)	5.00
			1,000 blanks, Form 9B (township clerks)	3 00
			1,000 envelopes, Form 2A	3.00
			125 circulars, Form 10B	1.50
July	1	4	500 envelopes, Form 3A	1.25
			100 postal cards, Form 1D	1.00
			200 labels	.75
			500 circulars, Form 10B	1.75

FINANCIAL STATEMENT—CONTINUED.

DATE.	Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1880.			
June 1	5	*American Express Company.*	
		Package, Lansing, $1; Lake Mills, 40c; Clarinda, 40c; Waterloo, 40c	$ 2.20
		Package, McGregor	.55
July 2	6	*Mills & Company.*	
		Slips, names of counties	1.50
		200 Form 3C blanks	4.00
		1,000 blanks Form 2C	9.00
		100 copies chapter 151, laws 1880	2.50
May 31	7	*C. H. Lathrop.*	
		1 copy Iowa Medical Directory	1.50
May 31	8	*United States Express Company.*	
		Transportation of packages	2.05
July 28	9	*Carter & Hussey.*	
		2,750 manilla envelopes	9.00
July 22	10	*L. Harbach.*	
		1 office stool	1.75
June 7	11	*Multigraph Company.*	
		1 copying tablet	3.70
July 31	12	*Secretary of State.*	
		100 six cent postal stamps	6.00
		100 three cent postal stamps	3.00
		100 two cent postal stamps	2.00
		1,400 one cent postal stamps	14.00
		200 Congress tie envelopes	9.00
		100 postal cards	1.00
Aug. 3	13	*Des Moines Post-office.*	
		600 one cent stamps	6.00
		500 three cent envelopes	16.20
Oct. 1	14	200 three cent stamps	6.00
		100 three cent stamps	3.00
Nov. 5	15	*Carter & Hussey.*	
		500 manilla envelopes	2.25
		150 circulars, Form 11B	3.50
		1,500 return of deaths, Form 6	43.00
		1,500 return of marriages, Form 5	43.00
		1,500 return of births, Form 4	43.00
		300 return of still-births, Form 7	8.86
		100 rollers	3.00
		Stitching	1.00
Aug. 5	15½	*L. F. Andrews (Secretary).*	
		Salary, quarter ending August 5	250.00
Nov. 2	16	*Redhead, Wellslager & Co.*	
		1 dozen Senate pads	3.00
		1 ream legal cap	3.25
		½ pint Carter's ink	.40
Nov. 17	17	*Osgood & Harris.*	
		2 towels	.50
Nov. 1	18	*Weaver & Maish.*	
		1 hair brush	1.75
		1 comb	.25
		1 box soap	.40
Nov. 2	19	*Mills & Abdill.*	
		1 scratch book	.20
		1 index memoranda	.35

FINANCIAL STATEMENT—CONTINUED.

DATE.	Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1880.			
Oct. 30	20	*L. F. Andrews.*	
		1 box pencils	$ 3.00
		1 rule	.50
		1 rule	.25
		1 bottle ink	1.00
		1 bottle carmine	.30
		2 boxes bands	.50
		1 glass tumbler	.10
		1 door key	.25
		1 bottle mucilage	.35
Nov. 5	21	*L. F. Andrews (Secretary).*	
		Salary quarter ending November 5	250.00
Nov. 2	22	*Des Moines Post-office.*	
		600 one-cent stamps	6.00
		100 10-cent; 25 5-cent; 50 2-cent; 100 1-cent stamps	13.25
August 3	23	*C. H. Lathrop.*	
		Iowa Medical Directory	1.50
Nov. 3	24	*Iowa State Register.*	
		100 slips from Daily	.75
		150 circulars, Form 12B	3.75
		1,000 blanks, Form 8B	5.00
		1,000 blanks, Form 1C	7.50
Nov. 9	25	*Des Moines Post-office.*	
		200 3-cent stamps	6.00
Nov. 9	26	*Secretary.*	
		Cleaning office	1.50
Nov. 10	27	*James L. Loring (Member of Board).*	
		Postage and envelopes	4.00
Nov. 10	28	*Des Moines Post-office.*	
		1,200 3-cent stamps	36.00
Nov. 10	29	*Mills & Abdill.*	
		1 volume "Schuman on Heat"	1.75
Dec. 1	30	*United States Express Company.*	
		Package transportation	.75
Nov. 23	31	*American Express Company.*	
		Package transportation	1.15
Dec. 1	32	*Des Moines Post-office.*	
		3,000 1-cent stamps	30.00
		United States Postal Guide	1.50
Nov. 26	33	*Holland & New.*	
		Painting sign	10.00
Nov. 30	34	*Mills & Company.*	
		5,000 envelopes, Form 9A (printing)	1.25
		500 envelopes, Form 10A	1.25
		100 vouchers, Form 3C	2.00
		500 printed envelopes	2.75
		3,000 manilla envelopes, No. 10, Form 2A	12.00
		5,000 circulars, Form 17B, (scarlet fever)	38 00
		5,000 circulars, Form 18B, (diphtheria)	38.00
		5,000 circulars, Form 14B, (clerks and health officers)	35.00
1881.			
Jan. 4	35	*Iowa State Register.*	
		3,000 circulars, Form 15B	6.00
		2,500 circulars, Form 16B (on drainage and sewerage)	40.65

FINANCIAL STATEMENT—CONTINUED.

DATE.		Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1881.				
Jan.	4	35	5,000 circulars, Form 13B (rules for local boards) ..	$ 39.80
Jan.	8	36	*Iowa State Leader.*	
			2 Brown's Letter Files	2.00
Dec.	11	37	*U. S. Express Co.*	
			Package transportation..........................	.25
Dec.	6	38	*American Express Co.*	
			Package transportation.....	.25
Nov.	30	39	*Capital City Gas Co.*	
			Gas..	4.50
Jan.	31	39½	*Mills & Company.*	
			1 rubber stamp..	2.50
			150 circulars, form 19B.........................	1.25
			300 blanks. Form 8C..............	4.00
			2,00 circulars, Form 21B (small-pox).............	21.00
			3,000 half-sheet circulars, Form 22B..............	7.00
Jan.	8	40	*J. D. Seeberger.*	
			1 step-ladder......................................	1.75
Jan.	1	41	*Redhead, Wellslager & Co.*	
			1 bottle French ink.............................	.60
			1 bottle Carter's ink..	.50
			2 gross bands....................................	.70
Feb.	5	42	*L. F. Andrews, Secretary.*	
			Salary quarter, ending February 5....	250.00
Feb.	1	43	*Carter & Hussey.*	
			Patching and bricking letter heads................	1.50
Feb.	2	44	*Des Moines Post-office.*	
			500 postal cards..................................	5.00
Feb.	28	45	*Capital City Gas Co.*	
			200 cubic feet of gas.............................	.60
Jan.	31	46	400 cubic feet of gas.............................	1.20
March	1	47	*Carter & Hussey.*	
			500 envelopes.....................................	2.75
			Printing 450 postal cards.........................	1.25
March	30	48	Binding 10 record books...........................	45.00
March	30	50	*Des Moines Post-office.*	
			1,000 one cent No. 6 envelopes...................	11.60
			500 three cent No. 4½ third quality envelope......	17.04
			2,000 two cent stamps..........................	40.00
April	1	51	*Redhead, Wellslager & Co.*	
			1 dozen scratch books	3.00
			Dunglison's Medical Dictionary...................	6.38
			12 gross, No. 5 bands............................	3.75
March	31	52	*Mills & Company.*	
			Mounting map	2.00
			1,000 circulars, Form 23B.....	4.50
			100 postal cards, Form 10C.......................	1.25
April	19	53	*R. N. Hyde.*	
			Cleaning room..............	2.00
May	1	54	*Secretary.*	
			Express, package to Red Oak......................	.25
			Cleaning furniture (office).......................	.50
March	31	55	*Capital City Gas Co.*	
			100 feet of gas.	.30

FINANCIAL STATEMENT—Continued.

DATE.	Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1880.			
May 2	56	*L. F Andrews (Secretary).* Salary for quarter ending May 5	$ 250.00
May 3	57	*H. H. Clark.* Circulars	3.00

EXPENDITURES FOR MEETINGS OF THE BOARD, 1880.

1880.		
May 5.	P. W. Lewellen, attendance and mileage	$ 27.50
	W. H. Dickinson, attendance	5.00
	F. F. Roberts, attendance and mileage	24.00
	J. L. Loring, attendance and mileage	5.00
	J. F. McJunkin, attendance and mileage	19.00
	E. M. Reynolds, attendance and mileage	22.50
	J. M. Hull, attendance and mileage	34.00
	H. H. Clark, attendance and mileage	38.00
	W. S. Robertson, attendance and mileage	17.00
Nov. 10.	P. W. Lewellen, attendance and mileage	30.00
	W. H. Dickinson, attendance	5.00
	G. F. Roberts, attendance and mileage	28.00
	E. M. Reynolds, attendance and mileage	23.00
	J. M. Hull, attendance and mileage	34.00
	W. S. Robertson, attendance and mileage	20.00
	J. L. Loring, attendance and mileage	8.00
		$340.00

EXPENDITURES FROM MAY 5 TO SEPTEMBER 30, 1881.

DATE.	Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1881.			
May 26	58	*Mills & Company.*	
		2,000 circulars, Form 25A (Treatment of Drowned).	$ 13.00
		1,000 pamplet report on pneumonia among cattle...	15.00
		2,000 pamphlets, Form 24A (Treatment of Drowned)	6.00
		1,000 Rules of State Board, for posting, Form 26B.	10.00
		2,000 blanks, reports, Form 2C	18.00
		½ ream letter heads	8.00
		1,500 circulars, Form 27B (transportation of corpses)	6.00
		2,000 circulars to local boards	5.75
June 1	59	*Des Moines Post-office.*	
		100 one cent No. 9 wrappers....................	1.12
		1,500 one cent No. 6 envelopes	17.40
		100 ten cent; 100 five cent stamps..............	15.00
June 1	60	*Carter & Hussey.*	
		250 envelopes, No. 10, Form 1A	1.75
		475 envelopes, No. 6, Form 3A	1.00
		2,500 envelopes, No. 10, Forms 2A and 5A	11.75
		100 labels (direction)	1.25
May 6	61	*J. B. Holland.*	
		2 volumes Buck's Hygiene	12.00
May 7	62	*Sanitary Engineer.*	
		1 volume 1880, bound...........................	5.00
		Subscription volume 4	3.00
June 1	63	*Redhead, Wellslager & Co.*	
		1 gross pens	.75
		1 quarter gross bands..........................	3.75
		1 quart Carter's fluid	.75
		1 inkstand	.70
		1 bottle carmine................................	.75
		1 finger dampener..............................	.75
May 31	64	*Iowa State Register.*	
		500 envelopes, Form 12A.........................	1.25
		150 circulars, Form 12B.........................	3.25
		150 circulars, Form 11B.........................	2.50
June 5	65	*L. F. Andrews.*	
		Salary, month ending June 5....................	100.00
May 31	66	*United States Express Company.*	
		Package transportation	.85
June 24	67	*Carter & Hussey.*	
		1,000 envelopes, Form 10A.......................	5.00
		1,500 return blanks, Form 4, births..............	32.50
		1,000 return blanks, Form 5, marriages	24.25
		1,000 return blanks, Form 6, deaths	24.25
		300 return blanks, Form 7, still-births..........	16.00
June 24	68	*Des Moines Post-office.*	
		2,500 one cent wrappers........................	28.00
July 5	69	*L. F. Andrews.*	
		Salary for month ending July 5..................	100.00

FINANCIAL STATEMENT—CONTINUED.

DATE.		Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1881.				
June	27	70	*Mills & Company.*	
			18 lbs. red Ex. paper, $1.62; ½ r'm statements, 65 cts.	$ 2.27
			1,000 circulars, Form 8B	5.25
			5,000 pamphlets, nosological tables	47.00
June	6	71	*W. H. Pratt.*	
			Two volumes White's Geology	6.00
June	22	72	*F. H. Little.*	
			Procuring water for analysis (Muscatine)	1.50
June	11	73	*Thomas Hackett.*	
			Janitor work for May	1.50
May	22	74	*American Express Company.*	
			Package transportation	2.00
Aug.	6	75	*R. J. Farquharson* (*Secretary*).	
			Salary for quarter ending August 5	300.00
			Expense to small-pox conference, Chicago	26.65
Aug.	5	76	*L. F. Andrews.*	
			Salary month ending August 5	100.00
July	2	77	*American Health Association.*	
			Five volumes reports	27.00
July	2	78	*Carter & Hussey.*	
			Printing 500 envelopes, Form 4A	3.00
			2,000 blank permits, Form 6E, trans. of corpses	15.00
July	28	79	*Des Moines Post-office.*	
			1,000 one cent stamps	10.00
July	1	80	*Weaver & Maish.*	
			One hygrometer	8.00
June	20	81	*Frank Pelton.*	
			One map of city of Des Moines	7.00
July	30	82	*L. Harbach.*	
			Hygrometer case	5.00
Aug.	1	83	*Mitchell, Bartlett & Crain.*	
			Six one gallon acid bottles	3.30
Aug.		84	*United States Express Company.*	
			Package transportation	3.70
July	7	85	*Junkermann & Haas* (Dubuque).	
			⅔ dozen ½ gal. acid bottles and boxing	2.86
July	16	86	*American Express Company.*	
			Package transportation	.25
Aug.	3	87	*Professor Thomas E. Pope.*	
			Analysis of eight waters at $2.50	22.50
			Analysis of eleven waters at $1.75	19.25
			Expressage paid on waters	6.45
Aug.	31	88	Examining of samples water at $2.50	22.50
			To fixing melting point of cerecloth mixture	2.50
			Expressage on water	1.75
Aug.	30	89	*Des Moines Post-office.*	
			2,000 one cent stamps; 500 two cent stamps	30.00
			500 postal cards	5.00
Sept.	1	90	*Mills & Company.*	
			Manilla wrapping paper	.20
			1,000 circulars, Form 27B, transportation of corpses.	4.75
			One ream lithograph letter-heads	10.00
Aug.	1	91	*Redhead, Wellslager & Company.*	
			Pencils	.20

EXPENDITURES—CONTINUED.

DATE.	Voucher.	TO WHOM AND FOR WHAT.	AMOUNT.
1881.			
Aug. 1	91	*Redhead, Wellslager & Co.*	
		1 White's Geography of Iowa	$ .50
		1 card rack	1.25
		Picture nails	.15
		1 set drawing instruments	4.00
Aug. 15	92	*W. E. Davis.*	
		Junitor service	3.00
Aug. 11	93	*James B. Mason.*	
		6 G. S. one-half bottles and boxing	1.90
Sept. 1	94	*Carter & Hussey.*	
		1 quire flat-letter	.20
		200 blanks, Form 10C	1.50
Aug. 12	95	*McBride & Will.*	
		4 G. S. bottles and boxing	1.25
Aug. 12	96	*Bibbins & Kelly.*	
		2 one-half gallon G. S. bottles and boxing	.75
Aug. 4	97	*Mitchell, Bartlett & Crain.*	
		1 gallon G. S. bottle	.40
Sept. 5	98	*L. F. Andrews.*	
		Salary for month ending September 5	83.33
		Total miscellaneous	$ 3,401.31
		Attendance of members	528.00
		Postage to members	16.46
		Total expenditures	$ 3,945.77

EXPENDITURES FOR MEETINGS OF THE BOARD FOR 1881.

May 5.	W. S. Robertson, attendance and mileage, $20; postage, $4	$	24.00
	P. W. Lewellen, attendance and mileage, $30; postage, $2.		32.00
	E. M. Reynolds, attendance and mileage, $23; postage, $2		25.00
	H. H. Clark, attendance and mileage, $38; postage, $8.46		46.46
	Smith McPherson, attendance and mileage		30.00
	W. H. Dickinson, attendance and mileage		5.00
	J. M. Hull. attendance and mileage		34.00
	James L. Loring, attendance and mileage		8.00
		$	204 46
	Expenditures for Board meetings for 1880		340.00
	Total expenditures for Board	$	544.46

CLASSIFIED EXPENDITURES.

Chemical analysis	$	84.41
Members attending meeting		528.00
Instruments and books		65 75
Paper and stationery		119.63
Postage Secretary's office		298.61
Postage, members		20.46
Printing and binding		1,038.78
Secretary, salary		1,300.00
Clerk		388.33
Special investigations		26.65
Express on packages		11.05
Fixtures		46.60
Gas		6.60
Janitor and miscellaneous items		10.90
	$	3,945.77

RECEIPTS—WARRANTS ON STATE TREASURER.

DATE.	No. of war.	TO WHOM PAYABLE.	AMOUNT.
1880.			
May 6	33263	W. S. Robertson	$ 17.00
	33264	P. W. Lewellen	27.50
	33265	G. F. Roberts	24.00
	33266	J. L. Loring	5.00
	33267	J. F. McJunkin	19.00
	33268	E. M. Reynolds	22.50
	33269	J. M. Hull	34.00
	33270	H. H. Clark	38.00
	33271	W. H. Dickinson	5.00
June 23	33558	Mills & Company	199.25
June 23	33559	Iowa State Register	41.00
	33560	Multigraph Company	3.70
	33561	Mills & Abdill	46.00
July 6	33739	L. F. Andrews	24.50
August 6	34054	L. F. Andrews	250.00
August 6	34055	L. F. Andrews	71.50
Oct. 7	34539	Des Moines post-office	9.00
Nov. 8	34776	L. F. Andrews	250.00
Nov. 10	34807	L. F. Andrews	250 96
Nov. 10	34808	P. W. Lewellen	30.00
Nov. 10	34809	W. H. Dickinson	5.00
Nov. 10	34810	G. F. Roberts	28.00
Nov. 10	34811	J. L. Loring	8.00
Nov. 10	34812	E. M. Reynolds	23.00
Nov. 10	34813	J. M. Hull	34.00
Nov. 10	34814	W. S. Robertson	20.00
Dec. 4	35006	L. F. Andrews	173.65
1881.			93.45
Jan. 8	35539	L. F. Andrews	
Feb. 5	35758	L. F. Andrews	290.80
March 12	35975	L. F. Andrews	10.80
April 5	36154	L. F. Andrews	134.52
May 4	36416	L. F. Andrews	294.46
May 4	36417	L. F. Andrews	255.75
June 7	36657	L. F. Andrews	266.32
July 7	36861	L. F. Andrews	296.52
July 7	36865	L. F. Andrews	1.00
August 5	37181	L. F. Andrews	511.76
Sept. 6	37386	L. F. Andrews	220.83
			$ 3,945.77

WORK OF THE BOARD.

The law creating the State Board of Health took effect April 3, 1880. The Board was organized May 5th. To put in operation the machinery of a system ramifying through every county, city, town, and township in the State required time. Owing to unavoidable delay incident to all new enterprises, the necessary blank forms for the use of clerks of the District and Circuit courts were not delivered until July 1st. There was a further delay in the reception of registers and returns of births, marriages, deaths, and still-births; so that practically the law was in operation less than three months in 1880.

Another source of delay was, copies of the law were not received by township clerks until several months after the adjournment of the legislature. In many instances they had not been received as late as November; so that township trustees had no knowledge of what was required.

Under all the circumstances, satisfactory progress has been made. Sanitary science and hygiene are subjects to which the people at large have paid little or no attention. They are new to them, and they have a meagre conception of their importance. They require educating and instruction. Hitherto, their chief end and aim has been to supply present necessities, prepare graveyards, and—fill them. Hence, the work of the State Board, during its existence thus far, has been to impart information, rather than attempt to coerce compliance with the statute, believing that public sentiment in favor of the law would secure more general obedience than force. Nothing is so costly as sickness. "Public health is public wealth." It is probably true that the loss from preventable sickness is more than the entire cost of the State government. To enlighten the people, and teach them how to escape sickness, is the sole object of this Board. Practical experience has demonstrated the wisdom of these organizations. Since Massachusetts first led off with a state board of health, in 1869, twenty-three States have organized and put in operation similar boards. These rapidly multiplying organizations evidence that the people have learned, and are learning the fact, that "disease and death are largely preventable." It has therefore been the aim of the Secretary to scatter as widely as possible the information prepared by the Board for the prevention of communicable diseases. The frequent repetition of requests for circulars issued by the Board indicates an increase of public attention in sanitary matters. There is strong hope that the increase of sanitary knowledge, and the consequent pressure of public opinion, will remove the apprehension which now so largely prevails, that the object and intent of the law is oppressive and subversive of individual freedom; and on the contrary, firmly establish the advantage and necessity of a central authority to which appeals can be made in disputed points, and from which shall come those measures of reform which will diminish the sorrow and suffering of a people liable to disease.

There is established the gratifying fact that in no State where a board of health has been created by statute has the law been repealed; but, on the contrary, constant modification and progress have been made, to meet advances of public sentiment and sanitary knowledge.

Respectfully submitted,

L. F. ANDREWS,
Secretary for 1880.

REPORT FOR 1881.

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
DES MOINES, IOWA, October 1, 1881.

To the President and members of the State. Board of Health.

GENTLEMEN—I have the honor herewith to submit, for your consideration, the following report of the affairs of the Board, from the fifth of May, 1881, to October 1st, this being the period fixed by law for the termination of the State year, and for the filing of all reports of State institutions. This report will be brief for the following reasons: Upon assuming the duties of Secretary on May 5th, I found that Mr. Andrews, my predecessor as Secretary, had by the action of the Board, been retained as assistant secretary. As he had, already begun his report, in detail, of all the proceedings, and other transactions of the Board, from its origin, I thought it but just to him and acceptable to other parties, that he should be allowed to finish it.

The following details are given, as nearly as possible, in the chronological order in which they occurred.

ROOMS IN THE CAPITOL FOR THE BOARD.

Soon after my appointment, in company with, and at the request of, Dr. Dickinson, a committee appointed at the last meeting, for the purpose, I made a written application for a suit of three (3) rooms, situated in the basement floor, and occupying the southwest corner of the capitol. These rooms are admirably adapted to the purpose, being sufficiently roomy, easily accessible, somewhat removed from the noise and bustle of the main floor, and provided with a large, strong room or vault for the better preservation of the archives, of great importance, both legally and statistically, which will, in a few years, accumulate on our hands.

TRANSPORTATION OF CORPSES.

At various times great trouble and annoyance has occurred to all parties concerned in the transportation of dead bodies, both to the shippers and the carriers, and this from the fact that there was no law, rule, nor regulation on the subject; nor was there any uniformity in the practice of the various express and railroad companies engaged in this particular kind of transportation.

At the request of Dr. W. F. Peck, Surgeon-general of the Chicago, Rock Island & Pacific Railway, I drew up the following rules, which, after being approved and signed by the President, were published for the information of all parties concerned. Copies of these regulations have been forwarded to the different railroads, the steamboat agents at the river towns, and to all undertakers, wherever names and addresses could be procured.

The regulations are now in force throughout the State, and, as far as known, give general satisfaction.

[FORM 27B.]

TRANSPORTATION OF CORPSES—RULES FOR THE TRANSPORTATION OF CORPSES BY RAILROADS AND STEAMBOATS IN THE STATE OF IOWA.

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.
DES MOINES, IOWA, May 20, 1881.

RULE 1. The transportation of bodies of persons dead of small-pox, Asiatic cholera, or yellow fever is absolutely forbidden.

RULE 2. From November 15th to March 15th, all dead bodies may be transported without restriction, except those dead of diphtheria, scarlet fever, typhus or typhoid fever, in addition to being in a metallic or wooden coffin, and this enclosed by a light wooden box, must be closely wrapped in a carbolated cere-cloth, or *some equally effective substitute.**

RULE 3. From March 15th to November 15th, all bodies presented for transportation must be prepared as described in the latter part of Rule two.

RULE 4. Every dead body must be accompanied by a physician's certificate of death, a permit for transportation from the clerk of the local board of health, and a written certificate from the shipping undertaker that the corpse has been prepared for transportation in accordance with the rules of the Iowa State Board of Health.

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*By order of the State Board, an india rubber cloth lined with a cloth saturated with an aqueous solution of carbolic acid, is an effective substitute.—SECRETARY.

INSTRUCTIONS FOR UNDERTAKERS.

RULE 5. A carbolated cere-cloth is a strong cotton winding-sheet, which has been dipped in a melted mixture of wax, tallow or lard and carbolic acid; a cheaper substitute is one dipped in a strong watery solution of carbolic acid, or of chloride of zinc (Burnett's solution).

W. S. ROBERTSON, M. D., *President*.

R. J. FARQUARSON, M. D., *Secretary*.

"Rules and regulations made by the State Board of Health and directed to local board of cities, towns, etc., are of full force and effect upon the people without subsequent endorsement or action of such local boards."—*Decision of the Attorney-general, January 4, 1881.*

Many inquiries being made as to the "carbolated cere-cloth" and ingredients necessary for its manufacture, at my suggestion, Prof. Thomas E. Pope of the State Agricultural College, kindly undertook a series of experiments to determine the proper proportion of these ingredients.

From the results of his experiments, the following formulæ were prepared and published for the benefit of undertakers and other parties concerned.

[FORM 30B.]

STATE OF IOWA—HEALTH DEPARTMENT—TRANSPOTATION OF CORPSES BY RAILROADS AND STEAMBOATS—CARBOLATED CERE-CLOTH FORMULA.

STATE BOARD OF HEALTH,
OFFICE OF SECRETARY,
DES MOINES, August 20, 1881.

Formula for mixture of wax and tallow, to be used by undertakers in the preparation of "Carbolated Cere-Cloth."

FOR SUMMER.

Wax one (1) part, tallow four (4) parts, melting point, 124 degrees F.

FOR WINTER.

Wax one (1) part, tallow thirty (30) parts, melting point, 98 degrees F. For either, carbolic acid *ad libitum*.

W. S. ROBERTSON, M. D., *President*.

R. J. FARQUHARSON, M. D., *Secretary*.

[FORM 6E.]

STATE OF IOWA—HEALTH DEPARTMENT—TRANSPORTATION OF CORPSES.

PHYSICIAN'S CERTIFICATE OF DEATH.

........Iowa,........188

Name of deceased........

Date of death..........188 . Age........yrs.,.........mos.,.........days

Place of death........

Cause of death........

I hereby certify that the same is true to the best of my knowledge and belief.

........M. D.

Residence of certifying physician........ County of........ Iowa.

UNDERTAKER'S CERTIFICATE.

........Iowa,........188

........hereby certify that the dead body of........ named in the foregoing physician's certificate, has been prepared by.........for transportation in accordance with the rules of the Iowa State Board of Health.

........Undertaker.

Residence of undertaker.........

TRANSIT PERMIT.

In accordance with the rules of the Iowa State Board of Health, dated May 20, 1881, permission is hereby given to........ company,........ for the transportation of the dead body of...... (If minor give parent's names.)........ from .... to....... for interment at........

Date of death........ 188 . Age........yrs.,......mos.,......days

Place of death........

Certificate of physician........ ....M. D.

....

Clerk of Board of Health.

[Filing.]

STATE OF IOWA—HEALTH DEPARTMENT—TRANSPORTATION OF CORPSES—

TRANSIT PERMIT.

From........to.......,Body of........ Died........188 . At ....

Cause of death........

RULES OF THE IOWA STATE BOARD OF HEALTH.

RULE 1. The transportation of the bodies of persons dead of small-pox, Asiatic cholera, or yellow fever is absolutely forbidden.

RULE 2. From November 15th to March 15th, all dead bodies may be transported without restriction, except that those dead of diphtheria, scarlet fever, or typhus or typhoid fever, in addition to being in a metallic or wooden coffin and this enclosed by a light wooden box, must be closely wrapped in a carbolated cere-cloth or some equally effective substitute.

RULE 3. From March 15th to November 15th, all bodies presented for transportation must be prepared as described in the later part of Rule 2.

RULE 4. Every dead body must be accompanied by a physician's certificate of death, a permit for transportation from the clerk of the local board of health, and a written certificate from the shipping undertaker that the corpse has been prepared for transportation in accordance with the rules of the Iowa State Board of Health

RULE 5. A carbolated cere-cloth is a strong cotton winding-sheet, which has been dipped in a melted mixture of wax, tallow or lard and carbolic acid; a cheaper substitute is one dipped in a strong watery solution of carbolic acid, or of chloride zinc (Burnett's solution).

W. S. ROBERTSON, M. D., *President.*

R. J. FARQUHARSON, M. D., *Secretary.*

(This blank can be obtained on application to the Secretary of State Board of Health, Des Moines.)

June 30 and July 1st, being then in attendance at a conference called by the Illinois State Board of Health, on the subject of small-pox, these regulations were adopted by that Board, and are now in force in the State of Illinois.

I find from correspondence with all the State Boards of Health, and with the authorities of some States not having Boards of Health, that no general laws or rules in regard to the transportation of corpses exist in these various States, so that our Board has the honor of having originated this important sanitary measure, which is now occupying the attention of other State Boards.

SMALL-POX.

The alarming prevalence of small-pox in various parts of the Northwest, and especially in Chicago, induced the Illinois Board of Health to invite other State Boards and other sanitary authorities to meet them in council upon this in Chicago. By direction of the President, Dr. Robertson, I attended that conference. Beside the Illinois Board the following boards were represented in this Conference: National Board of Health, those of New York, Maryland, Iowa, Wisconsin, Minnesota, Michigan and Indiana: also of the cities of Chicago, Baltimore, Milwaukee, and Buffalo. After a most animated and thorough discussion a report and resolutions were adopted.

The report is too long for transcription here. The resolutions were as follows:

THE RESOLUTIONS.

RESOLVED, 1. That small-pox is very prevalent in European ports at which emigrants embark for the United States, and, owing to the customary delay of the emigrants at these ports, unprotected persons are liable to, and frequently do, become infected with that disease.

2. That vast numbers of immigrants are unprotected against small-pox infection, and hence contract the disease just before embarking for the voyage.

3. That ocean transit is now so rapid that a person becoming infected with the small-pox poison may, and often does, reach the ports of the United States, and, even by rapid railroad travel, may locate in Western towns before the disease becomes apparent in the individual.

4. That outbreaks of small-pox in many parts of the United States, and the

liability to a wide and constant dissemination of the contagious and infectious material of that disease by means of the immense number of unprotected immigrants who daily land at our ports and immediately proceed to inland districts by railroads, demand the most energetic measures of health authorities to control the spread of this pestilence and to exterminate it wherever it maks its appearance in any community.

5. That to accomplish this desirable object there should be concert of action among the several sanitary organizations of the country, viz., National, State and municipal, and each in its own sphere should use its utmost power to stamp out this disease.

6. That, with a view to give practical effects to the objects of this conference, we recommend

(*a*) That Congress incorporate into the law regulating immigration a provision requiring protection from small-pox by successful vaccination of all immigrants.

(*b*) That the National Board of Health is requested to consider (in accordance with an act to prevent the introduction of contagious or infectious diseases into the United States, approved June 2. 1879), the propriety of making, promulgating and enforcing rules requiring the inspection at the port of departure of immigrants into this country, and the vaccination or re-vaccination of every immigrant who, upon such inspection, is found unprotected from small-pox. Or, failing in any case, or for any cause, to secure such vaccination or re-vaccination, to prevent such unprotected persons as may have come from or through any infected district from taking passage on any ship destined for this country during the period of incubation of the disease until such time shall have elapsed as shall make it certain that they are not carrying the germs of small-pox in their own persons.

(*c*) That notification be sent to the various steamship companies bringing immigrants to the United Statas that unless satisfactory evidence of recent vaccination be furnished (by certificate or otherwise) in the case of each immigrant arriving at any port of the United States such vessels should be quarantined for a sufficient length of time to insure the development of all undeveloped cases of small-pox, as well as for the discovery, if possible, of concealed existing cases which have developed during the voyage.

(*d*) That local health authorities should as far as practicable cause a thorough inspection of immigrants at all distributing points, and the detention at such points of all suffering from small-pox, and also the vaccination by the local authorities, if needed, of all immigrants who arrive at their destination.

(*e*) That to meet present emergencies the National Board of Health, by virtue of its power to prevent the introduction of contagious and infectious diseases into the United States and their spread from one State into another, take such measures as will secure the inspection of every immigrant before landing at the ports of the United States, and of the vaccination of all persons not protected.

(*f*) That a committee consisting of one from each State and local board represented be appointed, whose duty it shall be to take such measures as may be found necessary to accomplish the objects of these resolutions.

These resolutions were approved by the Illinois State Board immediately after their adoption, and upon my return, with the approval and signature of the President I forwarded the following approval:

The Iowa State Board of Health indorses the action of the sanitary conference, held in Chicago, June 29 and 30, for the prevention of the introduction of small-pox by immigration and its spread from one State to another, and will unite and co-operate to the full extent of its power and means in a systematic plan of operation to prevent the extension of this disease and secure general vaccination.

In view of the fact of the frequent introduction of small-pox into the interior of Iowa from immigrants, the Iowa State Board of Health would respectfully request the National Board of Health to secure the vaccination of all unprotected immigrants before they leave the ports of arrival in this country.

The Iowa State Board of Health therefore earnestly requests all health officers and local boards of health to secure a careful inspection of all immigrants entering this State, and a prompt vaccination and re-vaccination of all immigrants not sufficiently protected against small-pox.

A recent newspaper item is to the effect that the National Board of Health had determined to put inspectors at Boston, New York, Philadelphia, Baltimore, and Port Huron, the principal landing places of European immigrants; also, at such principal distributing depots in the interior, as Buffalo, Chicago, St. Louis and Omaha.

How much truth there is in the above is not known; but the fact, that at the present writing, small-pox is increasing rapidly in Chicago, is undoubted and would seem to urgently call for some immediate and energetic action on the part of all authorities interested in the prevention of the dissemination of contagious diseases.

Outbreaks of small-pox have occurred during the past year in various parts of the State, some of which have been reported to this office by the proper authorities, but these instances were few in number, the presence of the disease generally becoming known through the columns of the daily press.

While in Davenport on July 2d, I accidentally heard of a case of small-pox in Scott county, some six miles from that city. Upon visiting the spot I found one of those mild cases of varioloid or modified small-pox, that are particularly dangerous from being mistaken for chicken-pox, and from the ability of the person to travel about and thus spread the contagion. There were two unvaccinated children in the family, but the mother positively refused my offer to vaccinate them, and denied the existence of small-pox on her son; however, the history of the case would show otherwise, as he had sickened in Tama county after having been exposed to the small-pox, had returned home and had sought in Davenport for a colored man who was familiar with nursing small-pox cases in the hospital. The importance of the earliest possible intelligence of an outbreak of small-pox in any part of the State cannot be too strongly urged upon the attention of the health officers of cities, towns and local boards.

Their attention is also called to the danger of mistaking mild cases of modified small-pox for chicken-pox; such an error of diagnosis is frequently followed by very grave consequences. By just such a mistake an outbreak of small-pox occurred among the inmates of Mercy Hospital, Davenport; indeed, all cases of chicken-pox during the prevalence of small-pox in any part of the country should be regarded with the greatest possible doubt and suspicion. Before quitting the subject of small-pox I wish to add a few words on a most important point; *i. e.*, the necessity for the provision in every city, if not in every county, of a pest-house, or place suitable for the treatment of small-pox and of all other contagious diseases. The following is instructive and to the point: Hearing through the papers of the occurrence of a case of "spontaneous small-pox" at Lyons I made inquiries and learned that the case could be traced to a tramp from Chicago, who was taken ill with the disease in that town, was transferred from point to point in the town, then to the outskirts, where of course the neighbors objected to his presence, then to an island in the river, where, perhaps, as a natural result of this ambulating treatment of this case he was finally planted under the ground; net result being an expenditure of several hundred dollars, new cases from the dissemination of the contagion and suits for damages.

Winter after winter this terrible farce was acted at Davenport, until some one in an opportune moment urged upon the county and city authorities the propriety, the necessity, of providing a hospital for the proper care of such cases.

A joint appropriation of $2,500 was made by Scott county and the city of Davenport, and for this sum a neat, commodious, well ventilated hospital, affording ample accommodation for the treatment of twelve cases was built and furnished upon the grounds of Mercy Hospital, and placed under the charge of the Sisters of Mercy.

GLANDERS.

The communication of this loathsome affection from the horse to man does undoubtedly occur, but, fortunately, it is extremely rare. In compiling the deaths of 1879–80, one was put down as caused by glanders. I immediately wrote a letter to the physician reporting the case, but no answer has yet been received.

In August last, glanders was reported as prevailing in Lucas county, where, also, a case of its occurrence in a human subject was said to have been found. Upon addressing the physician in attendance, Dr. C. B. Powell, of Russell, I soon had a courteous and satisfactory reply which was to the effect that the patient in question, a lady, had an attack of erysipelas of the face, which followed, in a few days, and was apparently caused by discharge from the nostril of a horse, which was blown into her eye.

As the horse was not one of those known to have glanders; as the case was one of well-marked erysipelas, and presented no symptom of glanders; and as the patient completely recovered in a few days, Dr. Powell correctly inferred that it was not a case of that terrible disease.

WATER ANALYSIS.

After some correspondence, Prof. Thomas E. Pope, professor of chemistry in the State Agricultural College, kindly consented to make analyses of all waters which might be sent to him.

As Professor Pope has performed this delicate and scientific work in the most prompt and satisfactory manner, and as he has made a merely nominal charge as his compensation, I would respectfully ask that he be publicly thanked by a vote of the Board, and that if, in imitation of other States, we are to have a State Analysist, he should by all means have the appointment.

The table of results furnished by Prof. Pope embraced the analysis of thirty waters used for drinking purposes: Ten river waters from the Mississippi, Iowa, Cedar, Des Moines and Raccoon rivers; thirteen shallow well waters, from various parts of the State; six deep well waters, four from Dubuque and two from Des Moines; and three specimens of melted ice, one from the Mississippi River at Davenport and two from the Des Moines River at Des Moines. Prof. Pope's results as given below are in parts in one million, these have been reduced to grains per United States gallon (58,328) to make them more intelligible to the public, and are to be found, together with detailed explanatory notes as to the sources of the different waters, in the report of Dr. Dickinson on the Water Supply of the State. No standard for the determination of the comparative purity of drinking water has ever yet been agreed upon by authorities; one fact is very evident, however, which is that the standard set up by most of the English authorities cannot be applied to our drinking waters without the disagreeable result of the rejection of most, if not all, the potable waters in America as unfit for domestic use.

In this connection it may be remarked that we should most devoutly wish that the experiments now being made by Prof. J. W. Mallet, of the University of Virginia, at the instance of the National Board of Health, may result not only in establishing some standard for the estimation of the qualities of drinking water from a chemical analysis of the same; the best mode of conducting that analysis; and lastly, if that is possible, of pointing out the connection between certain chemical conditions of water and its production of disease.

TABLE I—WATER ANALYSIS.

Results expressed in parts per million (1,000,000).

	When taken.	Free ammonia.	Albuminoid ammonia.	Chlorine.	Suspended matter.	Solid residue on evaporation.	Loss on ignition.	What inorganic.	Hardness: One degree is equal to 470,000 of carbonate of calcium or its equivalent.
Muscatine well water				173.5		927		797	46
Muscatine river water		0.04	0.22	2.0	14.5	142	43	99	7
Marshalltown river water		0.0234	0.17	1.25	46	290	34	256	14
Marshalltown well water				268.9		1045		897	53
Anamosa river water		0.66	0.19	1.8					6.5
Anamosa, E. Booth's well				66.75		554		440	26
Anamosa, J. C. Dietz' well				20.7		268		208.5	10
Cedar Rapids Second Ward well water				86.1		947		846	27
Cedar Rapids First Ward well water				161.8		1129		961	38.5
Cedar Rapids river water		0.00	0.206	1.7	63.2	242	32.6	209.4	11
Ottumwa river water		0.04	0.400	2.75	381.4	582	64	518	5.5
Ottumwa well water				70.2		587		515	20.5
Dubuque well water				154.25		707		562.4	41
Dubuque artesian well that feeds water works				3.4		223	14	209	20.5
Dubuque water from level				3.75		254.4	17.4	237	23
Dubuque water from hydrant		0.00	0.030	3.50		248.4	16.2	232.2	23
Des Moines river water		0.026	0.130	1.95	3.5	157	11.6	145.4	10
Burlington river water		0.014	0.310	2.9	153	371	41.8	319.2	7.5
Burlington well water				87.5		865		750	56.5
W. H. D. No. 1	Aug. 4	0.120	0.060	82.4		730		644.8	38
W. H. D. No. 2	Aug. 4	0.0214	0.046	60.7		851.6		751.6	48
W. H. D. No. 3	Aug. 4	0.0534	0.150	76.3		1302.4		1198.4	70
E. G. No. 30	Aug. 4	0.0400	0.040	34.7		835.6		738.8	48
O. H. No. 1	Aug. 4	0.214	0.054	trace		12	4	8	0
O. H. No. 2	Aug. 4	0.240	0.034	trace		13	5	8	0
Davenport river water		0.088	0.320	1.35	30.4	235	31.4	203.6	9
Davenport well water		0.0266	0.124	49		751.6		701.6	32
Davenport ice water		0.266	0.194	trace		23.6	16.2	7.4	0
Clinton river water		0.0266	0.400	4.7	110	268.8	43.6	225.2	7
Clinton well water		0.033	0.082	18.8		564		462	32

TABLE II.—IOWA WATER—ALBUMINOID AMMONIA.

(*Parts in 1,000,000—Water Unfiltered.*)

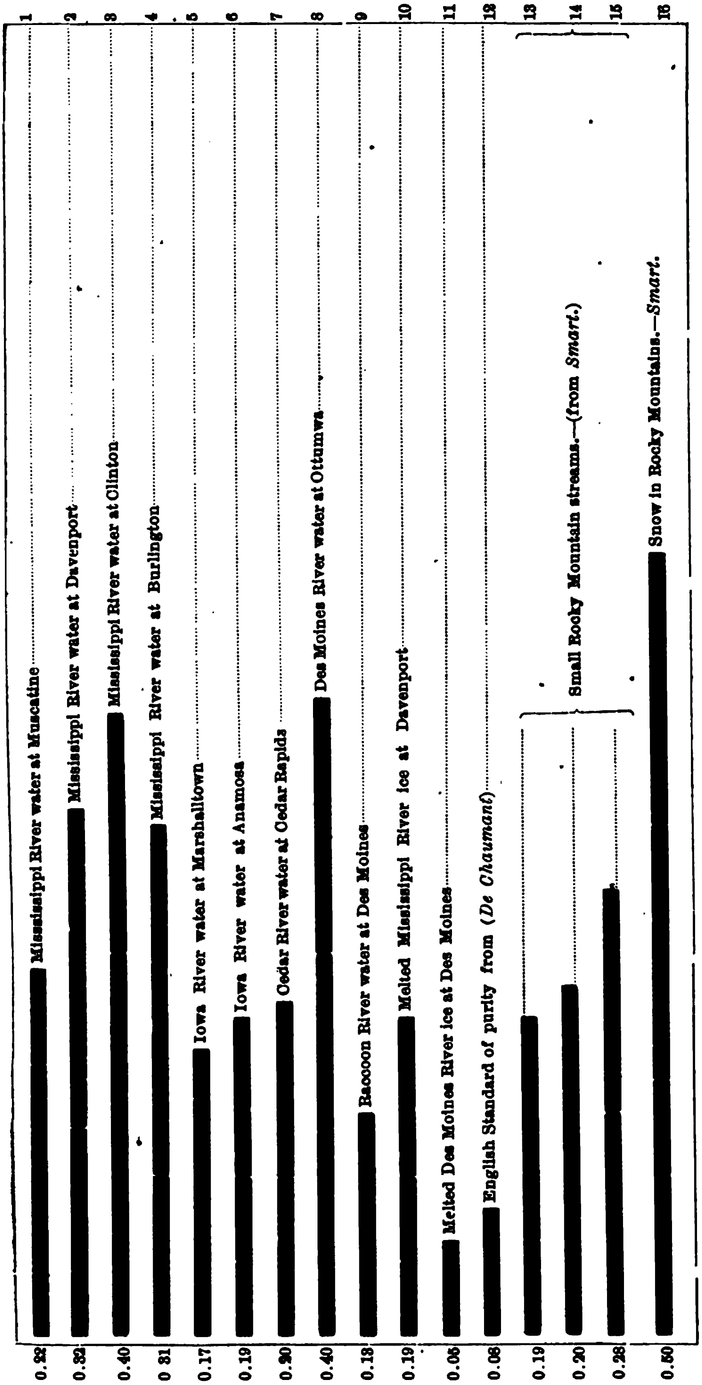
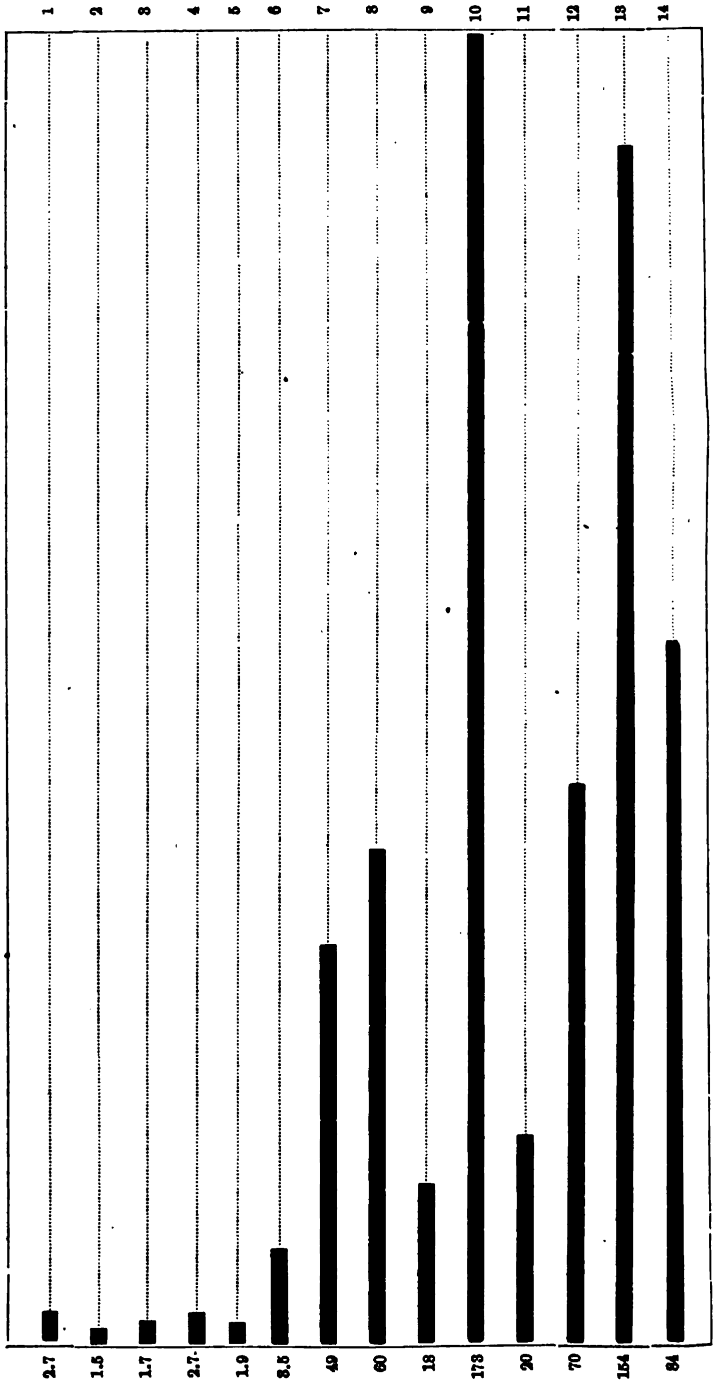


TABLE III—CHLORINE.

(Parts in 1,000,000.)



EXPLANATION OF TABLE III.

1. Mean chlorine of four Mississippi River waters.
2. Mean of two Iowa River waters.
3. Chlorine of one Cedar River water.
4. Chlorine of one Des Moines River water.
5. Chlorine of one Raccoon River water.
6. Dubuque water supply (deep well).
7. Shallow well at Davenport.
8. Shallow well at Des Moines.
9. Shallow well at Clinton.
10. Shallow well at Muscatine.
11. Deitz's well at Anamosa.
12. Shallow well at Ottumwa.
13. Shallow well at Dubuque.
14. Second Ward well at Cedar Rapids.

See, also, report of Dr. Dickinson on Water Supply, for further description of these waters.

CORRESPONDENCE WITH THE NATIONAL AND OTHER BOARDS OF HEALTH.

I. A correspondence with the National Board in regard to a standard nomenclature of diseases, which need not be reproduced here, as the result was to discover that there is no standard nomenclature.

II. From the Tennessee State Board of Health the following resolutions were received:

OFFICE OF
TENNESSEE STATE BOARD OF HEALTH,
NASHVILLE, April 6, 1881.

WHEREAS, It is believed that public confidence was preserved, and a sense of security engendered throughout the Mississippi Valley, by the operations of the inspection service of the National Board of Heath, during the summer of 1880; and

WHEREAS, It is desirable that such well grounded confidence and security be perpetuated in the interest of commercial and material progress, as well as in "the interest of health and life of the citizens of this State," with the general supervision and protection of which this Board is charged by law: therefore

Be it resolved, That the National Board of Health be, and it is hereby invited to co-operate with and aid the State Board of Health of Tennessee, in the execution and enforcement of its rules and regulations to prevent the introduction of contagious diseases.

Resolved, That in veiw of the increased facilities of communication with the Gulf and South Atlantic ports, the National Board is respectfully requested to advise, promptly, this Board of Health of threatened danger from that source at any time, together with such suggestions connected therewith, as it may be proper to make.

Resolved, That this Board formally approves and endorses the action of the Board of Health of the city of Memphis, as set forth in the following resolutions adopted at a special meeting held on the 29th day of March, 1881, as follows:

"*Resolved*, That the National Board of Health be respectfully requested to place on duty at New Orleans, and with other Southern ports as may be deemed necessary, an inspector or inspectors whose duty it shall be to supervise the shipment by river or rail, of goods, merchandise, baggage, etc., and to advise (cipher telegram) the resident member of the National Board of Health in this city, or in the event of his absence, his official representative, whenever such shipments are believed to be infected, or in anywise dangerous to public health; and that the National Board instruct its resident member to promptly inform this Board of the shipment of such infected or dangerious goods, etc., to this city.

"*Resolved*, That the quarantine grounds and bulidings on President's Island, be again tendered to the National Board of Health for use as an inspection station for the enforcement of the quarantine ordinance of the taxing district, which takes effect May 1st, prox., and for the general purposes of the inspection service of the National Board.

"*Resolved*, That copies of these resolutions and quarantine ordinance be transmitted to the Secretary of the Board of Health in Washington."

Resolved, That the Secretary be, and is hereby instructed to furnish a copy of the above resolutions to the Secretary of the National Board of Health, and the Boards of Health and and Sanitary Council of the Mississippi Valley.

Attest, W. M. CLARK, M. D.,
Secretary State Board of Tennessee.

To this the following reply was sent:

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
DES MOINES, May 18th 1881.

DR. W. M. CLARK, *Secretary Tennessee State Board of Health, Nashville, Tennessee.*

DEAR SIR—Your kind favor of the 11th inst., including resolutions of the Tennessee State Board of Health, came duly to hand. The Iowa State Board of Heath regards it as absolutely essential to the protection of the Valley of the Mississippi from the incursion of epidemic visitations of yellow fever that there should be a cordial co-operation between the National and State Health authorities of the Valley States, and that to the end we regard it as wholly important that the State Boards of the Mississippi Valley should invite the National Board to place its inspectors at such points within their jurisdiction, as in the judgment of the National Board the sanitary interests of the public may require, and that these inspectors should be encouraged by the various State health authorities to make the most thorough investigations of all matters affecting the public health.

Yours truly,

R. J. FARQUHARSON, *Secretary.*

Copies of this were sent to the Tennessee State Board and to the National Board of Health.

III. An extensive correspondence with all the State Boards in regard to the existence or not of laws or regulations in regard to the transportation of corpses, alluded to in previous parts of this report.

IV. A correspondence with Dr. Henry B. Baker, Secretary of the Michigan Board of Health, from whom I received much good advice and instruction in regard to the proper forms to be used in, and the proper mode of compiling vital statistics, for which I would here most sincerely thank Dr. Baker.

V. A correspondence with Dr. Hewitt, Secretary of the Minnesota Board of Health, in regard to an Inter-state Sanitary Conference held at Albert Lea, on August 31st.

As the President, with Drs. Dickinson, Roberts and Hull of the Board were present at this conference, some of them may report the result.

LEGAL.

The following correspondence explains itself:

STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
DES MOINES, September 7, 1881.

HON. SMITH MCPHERSON, *Attorney-general, Red Oak, Iowa:*

DEAR SIR—At Davenport, recently, a magistrate (Finger) decided that the board of health, composed of the mayor and three aldermen, had no legal existence.

At the trial, a criminal proceeding for disobedience of order of the board of health, the attorney for the defendant (Wm. Lane) read the charter of the city (1851), and moved that the order of the board of health be excluded from the evidence. Are cities under special charter exempt from the action of the Board of Health act (1880)?

Yours truly, R. J. FARQUHARSON, *Secretary.*

STATE OF IOWA,
OFFICE OF THE ATTORNEY-GENERAL,
DES MOINES, September 22, 1881.

R. J. FARQUHARSON, M. D., *Secretary State Board of Health, Des Moines:*

DEAR SIR—Yours of the 6th inst. was mislaid, and thus forgotten.

Without extending my views upon the question, I would say, that in my opinion the Board of Health law, being chapter 151, Eighteenth General Assembly, is applicable to cities organized under special charters.

Yours truly,

S. MCPHERSON, *Attorney-general.*

ADULTERATION OF FOOD.

ATALISSA, IOWA, May 10, 1881.

DR. R. J. FARQUHARSON, *Davenport, Iowa:*

DEAR SIR—What is your opinion of local boards of health examining into and prohibiting the sale of all adulterated food?

Would glucose sugar, and sirup giving sulphuric acid reaction with usual tests, be included with adulterated food?

Also, vinegar made with sulphuric acid?

Please answer as soon as possible, and oblige,

Yours truly,

J. S. TURNER, *Health Officer.*

IOWA STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
DES MOINES, May 17, 1881.

DR. J. S. TURNER, *Health Officer, Atalissa, Iowa:*

DEAR SIR—Yours of the 10th inst. came duly to hand. Local boards of health should examine into all cases of fraudulent or deleterious adulteration of food, which may occur within their jurisdiction, and should report the results of their examinations to the State Board of Health.

But in regard to legal prosecution, it would be well to proceed very slowly and cautiously, if at all. The only power to punish for adulteration is derived from section 4036, Code of 1873, the act creating the State Board conferring no additional power.

The people must be educated in sanitary matters, and publication of adulterations is oftentimes sufficient for their suppression. But here again, the health officer, or rather the party publishing, if names are used, renders himself open for libel, as recently occurred in Chicago.

The presence of a small quantity of a sulphate in sirup, or in glucose, would give a sulphuric acid reaction, without the presence of any free sulphuric acid.

Vinegar might give the same reaction, and yet be good vinegar.

Perhaps the next legislature may pass a more specific law, accurately defining adulterations; in the meantime it would be well to abstain from legal prosecutions, except, perhaps, in such cases of outrageous and flagrant violations of the law as would render a conviction certain.

Yours truly,

R. J. FARQUHARSON, *Secretary.*

VITAL STATISTICS.

The State Board of Health act has the following title: "An act to establish a State Board of Health in the State of Iowa, to provide for collecting vital statistics, and to assign certain duties to local boards of health, and to punish neglect of duties."

> SECTION 11. "It shall be the duty of the Board of Health to make a biennial report, through their Secretary or otherwise, in writing, to the Governor of the State, on or before the first (1st) day of December of each year preceding that in which the General Assembly meets; and such report shall include so much of the proceedings of the Board, such information concerning vital statistics, such knowledge respecting diseases, and such instruction on the subject of hygiene as may be thought useful by the Board, for disseminating among the people, with such suggestions as to legislative action as they may deem necessary."

These evidently impose upon the Board and its Secretary the duty of collecting, compiling, and publishing the vital statistics of the State.

But section 1, chapter 159, laws of 1876, requires all institutions, with a few named exceptions (in which the State Board of Health is not included), to make their reports on or before the first day of November. If the biennial report is to be made on or before November

1st, and is then to be put into the hands of the public printer, it would be impossible to comply with the requirements of section 11 of the Board of Health Act, which prescribes December 1st as the time for the report.

Again, the report would be made and in press before it would be presented to, read and considered by the Board, which does not meet until in November.

Obviously, either the time of the meeting of the Board must be fixed for an earlier period, say October, or the State Board of Health must be included in the list of exceptions, as is now the case with the Agricultural College and some other State institutions.

To make vital statistics worth compiling and publishing it is very evident that a complete and correct registration of the elements—births, still-births, marriages and deaths, must be made by the clerks of the courts.

Section 3, Board of Health act, should be so amended as to prescribe some penalty for the failure on the part of physicians or midwives to register their names.

Again, in the next to final line of section 3, the word "*and*" should be stricken out, and "*or*" inserted, so as to read "or at such other times as the Board may direct."

If the returns are sent in from the clerks on the 1st of October, it is obvious that many marriages, births and deaths occurring during the month of September will be excluded from the returns, thus rendering the statistics for the year (ending October 1st) imperfect, incorrect, and for compilation valueless, for it is probable that in no two counties in the State would the records include the same amounts of the September events.

There need be no hurry on the part of the clerks in forwarding the returns to this office; it is much more important that the returns be correct than that they should be received at an early period. Indeed, as it will always be impossible to compile the returns of the next preceding year in time for the biennial report, it would make no difference if the returns from the clerks were not sent in before the middle of December; that is to say, that the compilation of vital statistics in the reports will always be one year behindhand.

In connection with the registration of marriages, I would say that in the form (2) for the "Return of a Marriage to County Clerk," in the corresponding column of the Clerk's Record of Marriages (Form 18D), and in the Clerk's Return of Marriages (Form 5C), that the word "race" is stricken out. In the first place, it is entirely superfluous, as the nationality or race is sufficiently defined by the "place of birth," and the "color," and its presence in the returns leads to many curious efforts of imagination on the part of the persons filling the returns to define the expression "race," according to his peculiar views in regard to the meaning of that term. The following are a few of the changes rung upon that word "race," culled at random from the records: White; "Caucasian" of various kinds, "light," "blonde," "English" (*i. e.*, American), "Irish" of all counties of Iowa; and of all the States in the Union; "Scotch" of various counties and States; "French" do; "Scotch-Irish" do; "Europeans" of all counties and States; "Anglo-Saxon" do; these all being "Americans." Then we have "Americans" born in Germany, Austria, Holland, etc., this being inexplicable, the birthplace in this instance failing to correct the error. The following tables of the births, still-births, marriages and deaths in the State during that portion of the year (ending October 1st, 1880,) embraced by the returns on file in this office, is given for what it is worth, which is not much, except as a sample of what the vital statistics may be when we have full and correct returns.

As will be seen by referring to the death columns, where the period in days embraced by the report of death for each county is given, the time embraced in no two counties is the same, and, therefore, all comparison being useless, the compilation of tables was not carried beyond those given. The tables as given show the following by counties:

Population: (Census 1880), native, foreign, white, colored, and total.

Marriages: Of whites, of blacks, native or where both parties are Americans; foreign, where both parties are foreigners; mixed, where one is native and the other is foreign; unknown, where the nativity of one or other, or both parties is not stated, and total.

Deaths: Days embraced in the return,—white, colored and unknown; sex, male, female, and unknown; age—those under five years old, those over five; native, foreign and unknown.

Births: White, colored and unknown; sex, male female and unknown; parents, native, foreign, mixed and unknown.

Still-births: White, colored and unknown; sex, male, female and unknown.

The rate of mortality for each county is calculated, from the period embraced in the record, for one year, as so many deaths per thousand of the living population.

TABLE IV.

Population of Iowa by Counties, United States Census of Iowa.

COUNTIES.	TOTAL.	MALE.	FEMALE.	NATIVE.	FOREIGN.	WHITE.	Colored.*
Adair	11,199	5,971	5,228	10,187	1,012	11,191	8
Adams	11,888	6,364	5,524	10,720	1,168	11,800	88
Allamakee	19,791	10.284	9,502	14,141	5,650	19,754	37
Appanoose	16,636	8.619	8,017	16,123	513	16,563	73
Audubon	7,448	4.035	3,413	6,579	869	7,445	3
Benton	24.888	12.947	11,941	20.959	3.929	24,868	20
Black Hawk	23,913	12,271	11.642	19,986	3.927	23,876	37
Boone	20,838	10.807	10,031	16.732	4,106	20,585	253
Bremer	14,081	7,303	6,778	11,200	2,881	14,073	8
Buchanan	18.547	9,563	8,984	15,786	2,761	18,510	28
Buena Vista	7,537	4,008	3,529	5.772	1,765	7,537	0
Butler	14.293	7,604	6,689	12,043	2,250	14,262	31
Calhoun	5,595	3,002	2,593	4,693	902	5,593	2
Carroll	12,351	6,657	5,694	9,241	3,110	12,341	10
Cass	16,943	9,021	7,922	14,799	2,144	16,923	20
Cedar	18,937	9,805	9.132	16,281	2,656	18,880	57
Cerro Gordo	11,461	6,126	5,335	9.498	1,963	11.438	23
Cherokee	8,240	4.443	3,797	6,695	1,545	8.238	2
Chickasaw	14,534	7,505	7,029	11,559	2,075	14,534	0
Clarke	11,512	5,980	5,532	11,067	445	11,454	58
Clay	4,248	2,284	1,964	3,576	672	4,247	1
Clayton	28,829	14,872	13,957	21.490	7,339	28,828	1
Clinton	36,764	18,939	17,825	26.686	10.078	36,572	192
Crawford	12,413	6,736	5,677	8,938	3,475	12.391	22
Dallas	18,746	9,769	8,977	17,446	1,300	18,692	54
Davis	16.468	8,359	8,109	15,840	628	16,404	64
Decatur	15,336	7,981	7,355	14,810	526	15,208	128
Delaware	17,952	9,246	8,706	14.919	3,033	17,951	1
Des Moines	33,099	16,819	16,280	25,933	7,166	32.649	450
Dickinson	1,901	1,020	881	1,640	261	1,900	1
Dubuque	42,997	21,764	21,233	31,066	11,931	42,838	150
Emmet	1,550	832	718	1,118	432	1,547	3
Fayette	22,258	11,444	10,814	18,688	3,570	22,136	122
Floyd	14,677	7.607	7.070	12,125	2,552	14,672	5
Franklin	10,248	5,452	4,796	8.260	1,988	10,237	11
Fremont	17,653	9,394	8,259	16,721	932	17,589	64
Greene	12.725	6,678	6.047	11,222	1,503	12,709	16
Grundy	12,639	6,944	5,695	9,360	3,279	12.639	0
Guthrie	14,863	7,870	6,993	13,882	981	14,861	2
Hamilton	11.252	5,889	5,363	8,640	2,612	11,251	1
Hancock	3,453	1,924	1,529	2.567	886	3,453	0
Hardin	17.808	9,369	8,439	15,499	2,309	17,697	111
Harrison	16,649	8,859	7,790	15.099	1,550	16,632	17
Henry	20,826	10,633	10,193	18,925	1,901	20.320	506
Howard	10,837	5.742	5,095	8,335	2,502	10,817	20
Humboldt	5.341	2,860	2,481	4.155	1,186	5,337	4
Ida	4,382	2,451	1,931	3,615	767	4,382	0
Iowa	19,221	10,078	9,143	15,153	4,068	19,205	16
Jackson	23,771	12,286	11,485	18,661	5,110	23,762	9
Jasper	25,962	13,446	12.516	23,797	2,165	25,841	121

TABLE IV—CONTINUED.

COUNTIES.	TOTAL.	MALE.	FEMALE.	NATIVE.	FOREIGN.	WHITE.	Colored.*
Jefferson	17,478	8,868	8.610	15,806	1,672	17,407	71
Johnson	25,429	13,068	12.361	19,874	5,555	25,323	106
Jones	21,052	11,058	9,994	17,841	3.211	21.017	35
Keokuk	21,259	10.826	10,433	19,372	1,887	21,244	15
Kossuth	6,179	3,238	2,941	4,890	1,289	6,178	1
Lee	34.859	17,659	17,200	28.930	5,929	33,211	1,648
Linn	37,235	19,108	18,127	32.006	5,229	37,027	208
Louisa	13,146	6,806	6,340	12,224	922	13,080	66
Lucas	14,530	7,587	6,943	12,966	1.564	14.490	40
Lyon	1,968	1,082	886	1,551	417	1,968	.....
Madison	17,225	8.939	8,286	16,460	765	17.214	11
Mahaska	25,201	12,860	12,341	23.284	1,917	24.690	511
Marion	25,111	12,767	12,344	22,663	2,448	25.067	44
Marshall	23.752	12,267	11,485	20,680	3,072	23,629	123
Mills	14,135	7,646	6.489	12,860	1,275	14,118	17
Mitchell	14,361	7,472	6,889	10,963	3,398	14,356	5
Monona	9,055	4,879	4,176	7,868	1,187	8,966	89
Monroe	13,719	7,270	6,449	12,227	1,492	13,464	255
Montgomery	15,895	8,562	7.333	13,448	2,447	15,782	113
Muscatine	23,168	11,842	11,326	19.192	3,976	22,990	178
O'Brien	4,155	2,235	1.920	3,627	528	4.142	13
Osceola	2,219	1,177	1.042	1,888	331	2.219	.....
Page	19.667	10,458	9,209	17,673	1,994	19,421	246
Palo Alto	4,131	2,203	1,928	3,113	1.018	4.131	.....
Plymouth	8,567	4,639	3,928	6,122	2,445	8,563	4
Pocahontas	3,713	1,924	1,789	2,695	1,018	3,713	.....
Polk	42,395	22,097	20.298	36,166	6,229	41,720	675
Pottawattamie	39,846	22,160	17,686	32,740	7,106	39.228	618
Powesheik	18,936	9,940	8,996	17,015	1,921	18,874	62
Ringgold	12,085	6,418	5,667	11.492	503	12,070	15
Sac	8,774	4,800	3,974	7,138	1,636	8,774	.....
Scott	41.270	21,025	20,245	28,474	12,796	41,005	265
Shelby	12.696	6,952	5,744	10,279	2.417	12,683	13
Soux	5,426	2,978	2,448	3,618	1,808	5,425	1
Story	16,906	8,771	8,135	13,927	2,979	16,897	9
Tama	21,585	11,360	10,225	17,561	4,024	21,172	413
Taylor	15.635	8,242	7,393	14.842	793	15,505	130
Union	14,980	8,105	6,875	13,425	1,555	14,888	92
Van Buren	17,042	8,709	8,333	16,267	775	16,922	120
Wapello	25,282	13,016	12,266	22.680	2,602	24,822	60
Warren	19,578	10.167	9,411	18.636	942	19.515	463
Washington	20,375	10,361	10,014	18,518	1,857	20,280	95
Wayne	16,127	8,337	7,790	15,674	453	16.106	21
Webster	15,950	8.372	7,578	11,730	4.220	15.942	8
Winnebago	4,917	2,620	2,297	2,946	1,947	4,916	1
Winneshiek	23,937	12,303	11,634	16,071	7,866	23,920	17
Woodbury	14.997	8,211	6,786	11,952	3.045	14,789	208
Worth	7.953	4,221	3,732	5,132	2,821	7,944	9
Wright	5,062	2,763	2,229	4.282	780	5,062	.....
	1,624,463	848,235	776.228	1.363,015	261,448	1,614,510	† 9,953

*Including in Bremer county one Indian; in Cedar county four Indians and half-breeds; in Dallas counoy two Chinese and one Indian; in Fremont county five Indians; in Harrison county four half-breed Indians; in Howard county one Chinese; in Linn county three Chinese; in Marshall county one Chinese and twenty-seven Indians; in Polk county eighteen Chinese; in Wapello county two Chinese; in Winneshiek county two Indians.

†Including forty-seven Chinese and four hundred and sixty-four Indians and half-breeds. For additional details by counties see note above.

TABLE V—STATEMENT OF DEATHS BY COUNTIES.

Showing; 1, population; 2, total deaths; 3, sex—male, female, unknown; 4, color—white, colored, unknown; 5, nationality—foreign, native, unknown; 6, length of time in report; 7, mortality per 1000; 8, age—over five years, under five years.

COUNTIES.	Population.	Total deaths.	SEX.			COLOR.			NATIONALITY.			LENGTH OF TIME IN THE REPORT.			Mortality per 1,000.	AGE.		
			Male.	Female.	Unknown.	White.	Colored.	Unknown.	Foreign.	Native.	Unknown.	First death.	Last death.	No. of days.		Over five years.	Under five years.	Unknown.
Adair	11,199	16	9	7	....	16	..	...	2	13	1	May 11	September 27	139	3	10	6	....
Adams	11,888	20	7	13	....	20	..	...	0	16	4	June 7	September 29	114	5	10	10	....
Allamakee	19,791	15	6	9	....	15	..	...	3	10	2	June 22	September 21	91	3	9	6	....
Appanoose	16,636	34	19	15	....	34	..	...	0	33	1	June 14	September 23	81	9	15	19	....
Audubon	7,448	19	9	10	....	19	..	...	2	17	..	July 11	September 27	78	10	7	12	...
Benton	24,888	27	17	10	....	27	..	...	3	24	....	July 11	September 23	74	5	11	16	....
Black Hawk	23,913	44	20	23	1	44	..	...	9	29	6	April 22	September 24	149	4	28	16	....
Boone	20,838	45	22	23	....	45	..	...	4	39	2	April 10	September 30	173	4	26	19	....
Bremer	14.081	29	15	14	....	29	..	...	11	18	...	April 30	September 21	144	5	22	7	...
Buchanan	18,547	63	39	24	...	63	..	...	23	39	1	April 24	September 10	139	8	37	26	....
Buena Vista	7,537	3	1	2	....	3	..	...	....	3	....	July 1	August 13	35	3	2	1	....
Butler	14,293	26	17	9	....	25	1	...	5	21	....	April 3	August 28	137	4	11	15	....
Calhoun	5,595	13	8	5	....	13	..	...	1	12	....	August 10	September 28	49	16	7	6	....
Carroll	12,351	10	6	4	....	10	..	..	....	10	....	April 15	August 20	127	2	4	6	....
Cass	16,943	35	18	17	....	35	..	...	2	31	2	July 4	September 30	88	8	20	15	....
Cedar	18,937	41	20	21	....	41	..	...	5	34	2	May 8	September 21	136	5	22	19	....
Cerro Gordo	11,461	32	15	17	....	32	..	...	3	27	2	July 9	September 18	71	14	10	22	....
Cherokee	8,240	10	5	5	....	10	..	...	...	10	....	July 18	September 2	46	9	6	4	....
Chickasaw	14,534	11	5	6	...	11	..	...	1	10	....	July 19	September 4	47	5	6	5	....
Clarke	11,512	23	9	14	....	23	..	...	3	19	1	July 18	September 14	58	12	13	10	...

Clay	4,248	2	1	1	....	2	..	...	1	1	....	July	21	September	21	62	2	1	1	....
Clayton	28,829	33	21	12	....	33	..	...	4	29	....	April	4	September	27	176	2	17	16	....
Clinton	36,764	85	43	42	....	85	..	...	15	68	2	April	25	September	24	152	5	34	47	4
Crawford	12,413	25	12	13	....	25	..	...	5	20	....	July	8	September	9	63	9	9	16	....
Dallas	18,746	45	27	18	....	45	..	...	3	38	4	April	17	September	24	160	5	19	26	....
Davis	16,468	36	24	12	....	36	..	...	1	35	....	July	2	September	30	90	9	18	18	....
Decatur	15,336	21	9	12	....	21	..	...	....	20	1	July	7	September	25	80	6	12	9	....
Delaware	17,952	31	21	10	....	31	..	...	2	29	....	July	10	September	22	74	8	15	16	....
Des Moines	33,099	83	55	28	....	81	2	...	15	63	5	April	19	September	4	138	6	44	37	....
Dickinson	1,901	5	4	1	...	5	..	...	1	4	....	May	19	August	16	89	10	3	2	....
Dubuque	42,997	65	32	32	1	62	2	1	24	37	4	July	1	October	22	114	4	43	22	....
Emmet	1,550	No	retur	n.																
Fayette	22,258	43	23	20	....	43	..	...	5	37	1	April	24	October	21	181	3	24	19	....
Floyd	14,677	39	24	15	....	39	..	...	6	33	....	April	7	October	5	182	5	28	11	....
Franklin	10,248	10	4	6	....	10	..	...	....	10	....	July	20	August	18	28	11	1	9	....
Fremont	17,653	15	8	7	....	15	..	...	1	14	....	May	4	September	8	127	2	5	10	....
Greene	12,725	23	13	10	....	23	..	...	....	23	....	June	1	September	8	100	6	12	11	....
Grundy	12,639	39	21	18	....	39	..	...	5	32	2	May	6	September	29	147	7	15	24	....
Guthrie	14,863	53	20	33	....	53	..	...	....	52	1	May	1	October	6	158	8	20	33	....
Hamilton	11,252	15	7	8	....	15	..	...	3	12	....	July	23	September	30	69	7	8	7	....
Hancock	3,453	19	9	10	....	19	..	...	1	17	1	May	27	September	16	122	18	11	8	....
Hardin	17,808	54	31	23	....	45	5	4	2	52	....	April	20	September	22	156	7	31	23	....
Harrison	16,649	28	16	12	....	28	..	...	....	28	....	April	16	September	18	165	3	13	15	....
Henry	20.826	55	35	19	1	49	1	5	13	42	....	April	11	September	21	163	6	41	12	2
Howard	10,837	15	3	12	....	15	..	...	....	13	2	April	7	September	7	153	3	7	8	....
Humboldt	5,341	9	4	5	....	9	..	...	....	8	1	July	20	October	13	85	7	6	3	....
Ida	4,382	15	7	8	....	15	..	...	1	14	...	April	12	September	15	156	8	6	9	....
Iowa	19,221	22	11	11	....	22	..	...	2	19	1	April	15	September	9	147	2	10	10	2
Jackson	23,771	31	15	16	....	31	..	...	7	24	....	April	28	September	19	144	3	17	14	....
Jasper	25,962	27	11	16	....	27	..	...	6	21	....	July	6	September	30	86	4	11	16	....
Jefferson	17,478	47	24	23	....	45	..	2	5	39	3	June	10	September	16	98	10	27	20	....
Johnson	25,429	29	14	13	2	29	..	...	10	19	....	July	6	September	28	84	5	16	13	....
Jones	21,052	20	10	10	....	20	..	...	7	13	....	July	12	September	26	76	4	14	6	....
Keokuk	21,259	63	29	34	....	63	..	..	3	58	2	April	17	September	16	152	6	26	37	....
Kossuth	6,179	10	6	4	....	10	..	...	....	10	....	July	12	August	21	71	8	7	3	....
Lee	34,859	57	27	30	....	49	5	3	16	39	2	June	12	September	21	101	5	36	21	....
Linn	37,235	20	16	4	....	20	..	...	1	19	....	May	27	September	11	107	1	12	8	....
Louisa	13,146	43	20	23	....	42	1	...	2	40	1	April	1	September	19	172	7	22	20	1

TABLE V.—CONTINUED.

COUNTIES.	Population.	Total deaths.	SEX.			COLOR.			NATIONALITY.			LENGTH OF TIME IN THE REPORT.			Mortality per 1,000.	AGE.		
			Male.	Female.	Unknown.	White.	Colored.	Unknown.	Foreign.	Native.	Unknown.	First Death.	Last death.	No. of days.		Over five years.	Under five years.	Unknown.
Lucas	14,530		....	....	....	....	..	...	...	....	....		....	...	......	....	.....	....
Lyon	1,968	3	2	1	....	3	..	...	....	3	....	April 8	August 12	116	4	3		...
Madison	17,225	25	8	17	....	25	..	...	3	22	....	July 6	September 24	80	6	16	9	....
Mahaska	25,201	32	16	16	....	32	..	...	5	22	5	July 10	September 24	76	6	16	16	....
Marion	25,111	50	28	22	....	50	..	...	4	44	2	July 10	September 28	70	9	16	34	....
Marshall	23,752	21	13	8	....	19	..	2	1	14	6	July 10	September 24	76	4	10	11	....
Mills	14,135	17	8	9	....	17	..	...	....	16	1	April 8	September 29	174	2	10	7	....
Mitchell	14,361	19	7	11	1	19	..	...	4	15	....	March 10	September 14	188	2	14	5	....
Monona	9,055	12	6	6	....	12	..	...	....	12	...	July 13	September 18	77	6	3	9	....
Monroe	13,719	36	18	18	....	35	..	1	2	34	...	May 16	September 19	126	7	10	26	...
Montgomery	15,895	41	24	17	....	34	..	7	3	37	1	April 20	September 20	153	5	16	25	...
Muscatine	23,168	77	45	32	..	77	..	...	14	59	4	May 5	October 8	156	6	47	30	....
O'Brien	4,155	10	5	5	....	10	..	...	....	10	....	July 3	September 23	82	11	6	4	....
Osceola	2,219	2	1	1	....	2	..	...	....	2	....	August 18	August 18	1	365	....	2	....
Page	19,667	7	2	5	....	6	1	...	....	7	....	July 25	September 14	51	2	4	3	....
Palo Alto	4,131	11	7	4	....	11	..	...	3	8	....	July 8	September 4	58	17	8	3	....
Plymouth	8,567	15	8	7	...	15	..	...	1	14	....	June 24	September 9	77	7	6	9	....
Pocahontas	3,713	3	3	....	....	3	..	...	....	3	....	August 26	September 10	24	11	2	1	....
Polk	42,395	72	44	27	1	1	1	70	7	65	....	July 1	September 23	85	7	32	40	....
Pottawattamie	39,846	33	18	15	....	32	..	1	2	31	....	July 2	September 19	79	3	14	19	....
Poweshiek	18,936	43	23	20	....	42	.	...	6	37	....	April 13	September 30	170	4	18	25	....
Ringgold	12,085	29	17	12	....	29	..	...	2	27	....	April 2	September 20	171	5	11	18	....
Sac	8,774	2	1	1	....	2	..	...	....	2	....	August 10	October 16	66	1	1	1	....
Scott	41,270	103	53	50	....	97	1	5	23	77	3	April 4	September 22	171	5	50	53	....

Shelby	12,696	26	13	13	....	26	..	...	2	24	....	April	3	September	24	174	4	17	9	....
Sioux	5,426	4	2	2	....	4	..	...	....	4	....	July	19	August	11	23	12	0	4	....
Story	16,906	14	6	8	....	14	..	...	1	12	1	July	1	September	13	74	4	5	9	....
Tama	21,585	39	16	23	....	38	..	1	6	33	....	April	28	September	28	153	4	20	19	....
Taylor	15,635	23	13	10	....	21	2	...	....	23	....	June	16	September	28	104	5	11	12	....
Union	14,980	13	6	7	....	12	1	...	....	11	2	July	4	August	14	41	7	8	5	....
Van Buren	17,042	29	17	12	....	29	..	...	2	27	....	July	5	September	25	82	6	19	10	....
Wapello	25,282	80	45	35	....	71	1	8	6	73	1	July	5	September	25	112	10	39	41	....
Warren	19,578	51	20	31	....	51	..	...	1	50	....	April	18	September	27	162	6	21	30	....
Washington	20,375	42	26	16	....	42	..	...	6	36	....	May	2	September	18	139	4	28	14	....
Wayne	16.127	39	22	16	1	38	..	1	1	37	1	April	4	September	3	152	5	20	18	....
Webster	15,950	42	22	18	2	40	..	2	5	37	....	June	4	October	19	137	7	22	20	....
Winnebago	4,917	10	5	4	1	9	..	1	2	8	....	June	15	September	10	97	8	5	5	....
Winneshiek	23,937	23	14	9	....	23	..	...	10	13	....	July	1	September	28	89	4	16	7	....
Woodbury	14,997	15	9	6	....	15	..	...	2	12	1	June	20	September	21	93	4	5	10	....
Worth	7,953	4	1	3	....	4	..	...	....	4	....	July	19	August	13	25	7	0	4	....
Wright	5,062	10	8	2	....	10	..	...	....	9	1	July	6	September	29	85	8	8	2	....
Grand Total	1.624,463	2,862	1,519	1,332	11	2.723	24	115	368	2,408	86						5.666	1.465	1,388	9

REMARKS. Total population, 1,624,463; white, 1,614,510; colored, 9,953; males, 848,235; females, 776,228; native, 1.363,015; foreign, 261,448.
Total deaths, 2,862; males, 1,519; females, 1,332; sex unknown, 11; white, 2,723; colored, 24; unknown, 115; native, 2,408; foreign, 368; unknown, 86.
Mean mortality, per annum, per 1,000, calculated, 5.6666; over five years of age, 1,465; under five years of age, 1,388; age unknown, 9.
The low mortality shows that, except in a few rare instances, the total number of deaths is not recorded, even for the short time, embraced in most of the reports.

*Mean 6, excluding Osceola 365.0.

TABLE VI—STATEMENT OF BIRTHS AND STILL-BIRTHS.

Showing of births; 1, total births; 2, plural births; 3, color—white, colored, unknown; 4, sex—male, female, unknown: births and still-births by counties; 5, parentage—native, foreign, mixed, unknown. Showing of still-births: 1, total still-births; 2, sex—male, female, unknown; 3, color—white, colored, unknown.

COUNTIES.	Total births.	Plural births.	COLOR.			SEX.			PARENTAGE.				Total Still-births.	SEX.			COLOR.		
			White.	Colored.	Unknown.	Male.	Female.	Unknown.	N. N.	F. F.	M.	U.		Male.	Female.	Unknown.	White.	Colored.	Unknown.
Adair	42	....	40	..	2	18	24	..	40	2	...	...	...	...	...	..	...	..	..
Adams	93	4	91	2	.....	46	46	1	82	4	4	3	3	2	1	..	3	..	..
Allamakee	43	....	31	.	12	23	19	1	23	10	9	1	2	1	1	..	2	..	..
Appanoose	91	....	20	1	70	37	52	2	76	5	1	9	2	...	1	1	1	..	1
Audubon	43	2	42	..	1	17	26	..	33	5	4	1	...	...	...	..	...	..	..
Benton	44	....	43	..	1	22	22	..	36	5	1	2	6	5	1	..	6	..	..
Black Hawk (1)	78	2	4	..	74	46	28	4	38	17	15	8	2	1	1	..	...	..	2
Boone	80	2	69	..	11	35	45	..	60	7	11	2	1	1	...	..	1	..	..
Bremer	57	....	57	..	.....	23	33	1	45	6	6	...	4	1	2	1	4	..	..
Buchanan	88	2	88	..	.....	46	42	..	61	15	6	6	6	2	2	2	4	..	2
Buena Vista	27	....	27	..	.....	16	11	..	16	4	6	1	2	1	1	..	2	..	..
Butler (2)	47	....	31	..	16	24	23	..	28	8	7	4	4	3	1	..	3	..	1
Calhoun	12	....	11	..	1	5	7	.	9	...	3	...	...	...	...	..	...	..	..
Carroll (3)	27	....	27	..	.....	13	14	..	17	7	1	2	1	...	...	1	1	..	..
Cass	85	....	85	..	.....	42	39	4	71	10	4	0	5	3	2	..	5	..	..
Cedar	117	....	12	..	105	69	47	1	69	26	13	9	3	2	1	..	3	..	..
Cerro Gordo	75	....	74	..	1	36	39	..	50	11	12	2	2	1	1	..	2	..	..
Cherokee	14	....	14	..	.....	7	7	..	9	2	3	...	...	...	...	..	...	..	..
Chickasaw	25	....	1	..	24	18	7	..	14	5	3	3	...	...	...	..	...	..	..
Clarke	49	....	49	..	.....	17	32	..	47	1	1	...	6	1	4	1	4	..	2

Clay	8	....	.....	..	8	2	6	..	5	2	1	...	...	...	...	..	...	..	..
Clayton (4)	65	2	64	..	1	37	27	1	38	16	9	2	7	4	2	1	7	..	..
Clinton	133	2	133	..	.....	67	65	1	57	60	15	1	2	...	1	1	2	..	..
Crawford	54	....	54	..	.....	27	26	1	30	18	6	...	2	1	1	..	2	..	..
Dallas	107	2	107	..	.....	54	52	1	91	5	6	5	6	2	3	1	6	..	..
Davis	84	....	84	..	.....	36	47	1	74	4	6	...	1	...	1	..	1	..	..
Decatur	67	....	66	1	.....	32	35	..	58	...	4	5	2	2	...	..	2	..	..
Delaware	54	....	15	..	39	31	22	1	39	5	9	1	4	3	1	..	4	..	..
Des Moines	123	6	.....	2	121	57	61	5	81	29	9	4	7	5	2	..	5	2	..
Dickinson	2	....	2	..	.....	2	......	..	1	...	1	...	1	...	1	..	1	..	..
Dubuque	75	....	74	1	.....	43	30	2	47	19	18	1	2	...	2	..	2	..	..
Emmet	3	....	3	..	.....	2	1	..	1	1	1	...	...	...	...	..	...	..	..
Fayette	70	2	.....	..	70	37	31	2	44	10	10	6	4	3	...	1	3	..	1
Floyd	76	2	76	..	.....	43	31	2	52	13	8	3	10	8	2	..	10	..	..
Franklin	17	....	17	..	.....	9	8	..	7	2	7	1	...	...	...	..	...	..	..
Fremont	59	2	59	..	.....	33	26	..	55	1	2	1	3	2	...	1	3	..	..
Greene	76	2	74	..	2	43	32	1	59	5	12	...	2	1	...	1	2	..	..
Grundy	57	....	57	..	.....	31	26	..	37	10	9	1	3	1	2	..	3	..	..
Guthrie	101	2	101	..	.....	52	49	..	85	5	9	2	5	1	3	1	4	..	1
Hamilton	21	2	21	..	.....	9	12	..	15	1	4	1	3	...	...	..	...	..	..
Hancock	18	....	18	..	.....	10	8	..	12	2	3	1	...	...	...	..	...	..	..
Hardin	113	2	113	..	.....	60	53	..	88	5	14	6	5	1	4	..	5	..	..
Harrison	81	6	..	..	81	37	44	..	65	8	6	2	2	2	...	..	2	..	..
Henry	102	....	85	..	17	62	58	2	88	7	5	2	...	...	...	..	...	..	..
Howard	35	....	35	..	.....	15	19	1	23	6	4	2	2	2	...	..	2	..	..
Humboldt	10	....	2	..	8	6	4	..	6	2	1	1	...	...	...	..	...	..	..
Ida	34	....	34	..	.....	15	18	1	24	2	2	6	2	1	1	..	2	..	..
Iowa	70	2	70	..	.....	36	33	1	43	13	7	7	2	2	...	..	2	..	..
Jackson	67	....	.....	..	67	32	33	2	47	5	12	3	10	2	8	..	10	..	..
Jasper	62	2	61	1	.....	35	26	1	54	3	4	1	5	2	3	..	2	1	2
Jefferson	95	....	4	..	91	41	54	..	81	7	4	3	6	3	3	..	6	..	..
Johnson	60	....	60	..	.....	26	34	..	45	12	2	1	4	4	...	..	4	..	..
Jones	38	2	.....	..	38	20	18	..	28	7	3	...	...	...	...	..	...	..	..
Keokuk	140	4	.....	..	140	66	74	..	101	13	10	16	3	2	1	..	1	..	2
Kossuth	9	2	9	..	.....	8	1	..	5	...	4	...	...	...	...	..	...	..	..
Lee	90	4	64	2	24	46	44	..	65	0	9	6	2	1	1	..	2	..	..
Linn	36	2	36	..	.....	23	13	..	27	4	5	...	1	1	...	..	1	..	..
Louisa	82	....	82	..	.....	42	40	..	62	2	12	6	...	...	...	..	...	..	..

TABLE VI—CONTINUED.

COUNTIES.	Total births.	Plural births.	COLOR.			SEX.			PARENTAGE.				Total still-births.	SEX.			COLOR.		
			White.	Colored.	Unknown.	Male.	Female.	Unknown.	N. N.	F. F.	M.	U.		Male.	Female.	Unknown.	White.	Colored.	Unknown.
Lucas (no report)	....	....	....	..	....	....	....	..	....	...	...	...	...	...	...	..	...	..	..
Lyon	8	....	8	..	....	2	6	..	6	1	1	...	0	...	...	..	...	..	..
Madison	84	2	84	..	....	42	42	..	76	4	4	...	3	1	2	..	8	..	..
Mahaska	73	....	0	1	72	38	33	2	56	7	3	7	6	3	1	2	5	..	1
Marion	128	4	128	..	....	66	61	1	98	17	10	3	5	5	...	..	5	..	..
Marshall	61	8	....	..	61	29	25	7	44	6	2	9	7	4	2	1	6	..	1
Mills	51	....	51	..	....	30	21	..	42	4	5	...	0	...	...	..	...	..	..
Mitchell	51	...	49	..	2	27	24	..	30	13	4	4	6	2	3	1	6	..	..
Monona	20	....	14	..	6	12	8	..	18	...	2	...	1	...	1	..	1	..	..
Monroe	86	4	85	1	....	44	42	..	68	7	5	6	2	2	...	..	2	..	..
Montgomery	78	....	26	..	52	36	40	2	63	4	7	4	4	1	2	1	4	..	..
Muscatine	172	....	167	1	4	94	73	5	110	31	24	7	0	...	...	..	...	..	..
O'Brien	7	....	7	..	....	3	4	..	3	2	2	...	1	1	...	..	1	..	..
Osceola	3	....	2	..	1	1	2	..	3	...	...	..	1	...	1	..	1	..	..
Page	43	....	1	2	40	21	22	..	38	2	2	1	2	2	...	..	1	1	..
Palo Alto	16	....	1	..	15	8	8	..	11	1	4	...	1	...	1	..	1	..	..
Plymouth	25	....	25	..	....	17	8	..	14	8	3	...	3	1	2	..	3	..	..
Pocahontas	7	....	6	..	1	3	4	..	3	3	1	...	0	...	...	..	...	..	..
Polk	164	....	2	1	161	88	74	2	117	31	13	3	14	4	7	3	1	2	11
Pottawattamie	83	2	....	3	80	42	37	4	46	22	13	2	4	2	2	..	4	..	..
Poweshiek	110	6	109	1	....	47	59	4	88	12	8	2	8	6	2	..	8	..	..
Ringgold	93	4	93	..	....	45	48	..	88	...	4	1	4	1	3	..	4	..	..
Sac	3	....	3	..	....	1	2	..	1	2	...	...	2	1	...	1	1	..	1
Scott	255	4	....	..	255	126	127	2	66	127	60	2	8	5	3	..	8	..	..

Shelby	87	....	87	..	....	37	50	..	63	14	7	3	4	1	3	..	4	..	..
Sioux	50	2	9	..	41	27	23	..	11	26	13	...	0	...	...	..	...	..	..
Story	41	....	38	..	3	21	18	2	27	5	6	3	0	...	...	..	...	..	..
Tama	80	....	80	..	....	38	41	1	66	10	4	0	2	1	...	1	1	..	1
Taylor	42	....	41	1	....	16	26	..	39	..	3	...	6	4	1	1	5	..	1
Union	32	2	32	..	....	16	16	..	22	2	6	2	2	...	2	..	2	..	..
Van Buren	91	....	90	1	....	41	50	..	84	...	5	2	0	...	...	..	...	..	..
Wapello	180	....	11	4	165	76	103	1	141	18	20	1	8	1	6	1	6	..	2
Warren	164	8	....	2	162	77	86	1	147	6	5	6	10	1	8	1	10	..	..
Washington	87	....	86	..	1	53	34	..	68	8	6	5	4	4	...	..	4	..	..
Wayne	110	2	110	..	..	63	47	..	89	3	2	16	3	2	1	..	3	..	..
Webster	78	....	78	..	....	39	39	..	43	22	9	4	7	6	...	1	6	..	1
Winnebago	19	2	19	..	....	11	8	..	6	9	4	...	0	...	...	..	...	..	..
Winneshiek	48	....	35	..	13	21	27	..	31	7	10	...	3	2	1	..	3	..	..
Woodbury	16	....	1	..	15	10	6	..	11	3	2	...	1	1	...	..	1	..	..
Worth	13	....	13	..	...	10	3	..	79	2	4	...	0	...	...	..	...	..	..
Wright	15	....	15	..	....	10	5	..	9	3	3	...	1	1	...	..	1	..	..
Grand total	6.305	114	4.102	28	2,175	3,153	3.078	74	4,537	876	649	243	290	149	115	26	251	6	33

REMARKS.—(1) In this county two illegitimate births are recorded.

(2) The number of foreign births is here, as elsewhere, increased by the entry of "English," no birth-place being given; "English" meaning "American," or native of United States.

(3) The births from foreign parentage is here, as elsewhere, increased by the use of the term "German," without any birth-place, meaning a native of German descent, or one having a German name.

(4) In this county two "bastards" are recorded. Total births, 6,305; plural births (twins), 114; white births, 4,102; colored births, 28; unknown, 2,175; male births, 3,153; female births, 3,078: unknown sex, 74; births of N. N. parents, 4,537; births of F. F. parents, 876; births of M. parents, 649; births of V. parents, 243.

(5) Scott county has a large foreign population, but the foreign parentage is undoubtedly swelled in the record by the use of the term "German," without a birth-place, meaning generally "American."

(6) Twin females; total still-births, 290; males, 149; females, 115; sex unknown, 26; white still-births, 251; colored, 6; color unknown, 33.

N. N.—Both parents native.

F. F.—Both parents foreign.

M.—Mixed; *i. e.*, one parent foreign and the other native.

V.—Unknown; one or both parents unknown.

TABLE VII—MARRIAGES BY COUNTIES.

Showing, 1; total marriages; 2, color—white, colored, unknown: 3, nationality of parties married—native, goreign, mixed, unknown.

COUNTIES.	Total marriages.	COLOR.			NATIONALITY.			
		White.	Colored.	Unknown.	N. N.*	F. F.†	M.‡	U.§
Adair	18	18	..	...	14	...	3	1
Adams (1)	22	22	..	...	17	...	4	1
Allamakee	22	21	1	...	16	...	4	2
Appanoose	31	31	..	...	25	1	4	1
Audubon	17	17	..	...	16	1	...	...
Benton	8	8	..	...	5	2	...	1
Black Hawk	10	10	..	...	8	...	2	...
Boone	42	41	1	...	23	10	7	2
Bremer	14	14	..	...	14	...	...	...
Buchanan	61	61	..	...	16	...	2	43
Buena Vista	6	6	..	...	4	2	...	...
Butler	16	16	..	...	14	...	2	...
Calhoun	5	5	..	...	5	...	...	...
Carroll	41	41	..	...	18	2	6	15
Cass, no report								
Cedar	24	24	..	...	17	...	4	3
Cerro Gordo	9	9	..	..	7	2	...	...
Cherokee	6	6	..	...	3	1	2	...
Chickasaw, no report								
Clarke	12	12	..	...	11	...	...	1
Clay	6	6	..	...	2	...	...	4
Clayton	17	17	..	...	10	4	1	2
Clinton	33	33	..	...	16	11	5	1
Crawford	9	9	..	...	5	2	2	...
Dallas	15	15	..	...	15	...	...	...
Davis	19	19	..	...	19	...	...	...
Decatur	31	30	1	...	29	...	2	..
Delaware	26	26	..	...	23	1	2	...
Des Moines	38	36	2	...	19	11	6	2
Dickinson, no report								
Dubuque (2)	327	18	1	308	6	3	4	314
Emmet, no report								
Fayette	37	36	1	...	23	1	2	11
Floyd	32	32	..	...	21	5	6	...
Franklin	8	8	..	...	5	1	2	...
Fremont	18	18	..	...	13	...	1	4
Greene	15	15	..	...	12	...	2	1
Gruudy	19	19	..	...	10	5	3	1
Gnthrie	23	23	..	...	21	1	1	...

TABLE VII—CONTINUED.

COUNTIES.	Total marriages.	COLOR.			NATIONALITY.			
		White.	Colored.	Unknown.	N. N.*	F. F.†	M.‖	U.§
Hamilton	10	10	..	...	7	2	1	...
Hancock	6	6	..	...	4	2	...	...
Hardin	33	33	..	...	26	1	2	4
Harrison	13	13	..	...	13	...	...	...
Henry	25	25	..	...	21	...	2	2
Howard	7	7	..	...	4	...	3	...
Humboldt	5	5	..	...	2	...	3	...
Ida	14	14	..	...	11	1	2	...
Iowa	22	22	..	...	16	5	1	...
Jackson	13	13	..	...	9	1	1	2
Jasper	53	52	1	...	28	5	3	17
Jefferson	30	30	..	...	22	4	4	...
Johnson	53	52	1	...	15	3	5	30
Jones	17	17	..	...	10	2	...	5
Keokuk	23	23	..	...	20	...	1	2
Kossuth	6	6	..	...	5	...	...	1
Lee	26	26	..	...	20	3	3	...
Linn	35	34	1	...	26	5	4	...
Louisa	14	14	..	...	12	...	1	1
Lucas, no report								
Lyon	4	4	..	...	3	1	...	...
Madison	24	24	.	...	21	...	...	3
Mahaska	40	36	4	...	35	...	2	3
Marion	17	17	..	...	13	2	2	...
Marshall	44	44	..	...	26	4	5	9
Mills	17	17	..	...	13	2	1	1
Mitchell	8	8	..	...	6	1	1	...
Monona	19	18	..	...	13	1	4	...
Monroe	37	36	1	...	33	2	2	...
Montgomery	17	16	1	...	9	3	3	2
Muscatine	32	32	..	...	26	1	1	4
O'Brien	6	6	..	...	2	...	2	2
Osceola	1	1	..	...	1	...	...	...
Page, no report								
Palo Alto	1	1	..	...	1	...	...	...
Plymouth	8	8	..	...	4	1	2	1
Pocahontas, no report								
Polk	123	123	..	...	42	7	5	69
Pottawattamie	78	78	..	...	41	7	7	23
Poweshiek	12	12	..	...	9	1	2	...
Ringgold	18	18	..	...	17	...	1	...
Sac	4	4	..	...	3	...	1	...
Scott	49	46	3	...	30	11	8	...
Shelby	23	23	..	...	15	4	4	...
Sioux	6	6	..	...	1	2	3	...
Story	31	31	..	...	23	4	3	1
Tama	20	20	..	...	17	2	1	...
Taylor	17	17	..	...	16	...	1	...
Union	17	16	1	...	13	...	1	3
Van Buren	6	6	..	...	5	...	1	...
Wapello	58	57	1	...	39	2	7	10

TABLE VII.—Continued.

COUNTIES.	Total marriages.	COLOR.			NATIONALITY.			
		White.	Colored.	Unknown.	N. N.*	F. F.†	M.‖	U.§
Warren	32	32	...	...	31	...	1	...
Washington	17	17	...	...	13	2	2	...
Wayne	15	15	...	...	12	...	2	1
Webster	24	24	...	...	11	8	5	...
Winnebago	9	9	...	...	5	1	3	...
Winneshiek	18	18	...	...	11	2	3	2
Woodbury	19	19	...	...	12	4	3	...
Worth	4	4	...	...	1	1	...	2
Wright	2	2	...	...	2	...	...	...
Grand total	2,318	1,989	21	308	1,328	176	204	610

(1.) In Adams county is recorded the marriage of a white man with a woman "designated as nearly white."

Total marriages, 2,318; marriages of whites, 1,989; marriages of colored, 21; total, 1,318.

†N. N. marriages, 1,328; ‡F. F. marriages, 176; ‖M. marriages, 204; V. unknown, 610; total, 2,318.

(2.) This report covers one year, but is very incomplete, as is seen.

ILLUMINATING OILS.

Every reader of the daily papers must be struck with the great frequency of accidents, from coal oil in this state; deaths (after most horrid suffering), from this cause are fully as frequent as those from lightning stroke, yet they do not appear to excite the same amount of attention, or publicity.

Though only in part insuring the safety of mankind, properly constructed lightning-rods assure almost complete protection to property, and in like manner laws properly prepared, in regard to the inspection and sale of illuminating oils, would procure as great if not greater immunity to womankind (who are almost the sole sufferers from coal oil accidents), from the dangers incident to the domestic use of kerosene. No one who is aware of the history of the subject in Michigan, where, by the enforcement of judicious inspection of coal oils, the frequency of accidents from their use was reduced from what it is now in this and other States without inspection laws, to a state of almost complete immunity from accident.

This State is mentioned as one without an inspection law, and such is virtually the case, for the law is not enforced, and remains a dead-letter, and like all such laws does private injury. It is easy enough by comparison of the laws of the two States to see why ours is a failure. The Michigan law is mandatory, and uses the term "shall," while that of Iowa is permissive, and employs the term "may."

Again, the Michigan law allows to the inspectors the following scale of renumeration: Forty cents single barrel, on five or less; twenty-five cents on ten or less, and ten cents on each additional barrel over ten, while the Iowa law allows but five cents per package, at which rate, considering the time required for each test, no one could earn his salt.

Both laws are defective, in not prescribing the form of apparatus to be used by the inspector; in Michigan this fault is corrected by the inspectors using the apparatus recommended by the State Board of Health; any one aware of the uncertainty of many modes of testing, especially any one who has witnessed the feat of an itinerant vender of some terribly explosive oil, in plunging a lighted match into the same with impunity, must be aware of the need of prescribing the use of some good and approved apparatus for the inspection of oils.

My attention was recently and forcibly called to the condition of the law in this State by a letter of inquiry from Prof. Elliot, of the

Columbia School of Mines, to whom the subject of coal oils had been assigned by the New York State Board of Health, asking for information in regard to the law in this State and its action.

EXPENDITURE.

The expenditures of the office since May 5th, up to October 1st, are included in the report of Mr. Andrews.

All of which is respectfully submitted by

Your obedient servant,

R. J. Farquharson, *Secretary.*

WATER SUPPLY,

AND ITS

Relation to Health and Disease.

BY

W. H. DICKINSON, M. D.,

MEMBER OF THE

STATE BOARD OF HEALTH,

AND

CHAIRMAN OF STANDING COMMITTEE ON FOOD, DRINKS, AND WATER SUPPLY.

WATER SUPPLY.

From the earliest times an abundance of pure water has been regarded by mankind as one of the most desirable of blessings. When men, in the progress of civilization, began to mass themselves together in cities, one of the problems which early demanded consideration was, how to supply themselves with pure water.

There were various sources of supply—from wells, from streams, and from rain-water stored in cisterns. Some cities, like Rome, undertook gigantic hydraulic works, building magnificent aqueducts to conduct the water from distant sources of supply into the imperial city. Jerusalem constructed vast cisterns hewed out of the solid rock, and filled them by subterranean conduits leading outside the walls of the city. The great importance of pure drinking water as a factor in the preservation of health is becoming more and more recognized by scientists and medical men. It is now generally conceded that impurities in water are more potent in the origin and spread of disease than any other cause, and that the germs of many of the more fatal forms of disease are introduced into the system by means of water. Epidemics of zymotic disease, as typhoid fever and diphtheritis, have so frequently been proved to have arisen from the use of contaminated water, that there is no question as to its influence. This is abundantly shown in the fact that so soon as the cause is removed the disease has abated. It is true that this class of diseases arises from other causes, but the use of impure water is one of the most frequent. It is asserted by some writers who deny the connection between the use of polluted water and the increase of disease that water known to be very impure has been used for years with immunity from any zymotic disease. Although much has been said *pro* and *con,* it is undoubtedly true that the weight of evidence favors the theory that polluted water may, and does, become the cause of disease, and therefore the great importance which writers on sanitary science attach to the subject, and the importance of educating the public to right views and practices concerning their water supply.

SOURCES OF SUPPLY.

There are five sources of supply; namely, springs, streams and lakes, rain-water, and wells, each possessing different degrees of purity, They are the natural drains of the territory through which they pass, receiving not only the rain-fall, but also all organic and inorganic matter washed into them by a thousand tributaries. After rains they become turbid with earth. They are the receptacles of all the waste products of the inhabitants of the district; they receive the contents of sewers, cess-pools and privies; the offal of distilleries, slaughter-houses and tanneries, and the refuse of factories. Into them are thrown carcasses of dead animals as the most expeditious method of burial. From swamps they receive the matter of vegetable decomposition, and are discolored by flowing over beds of peat. In the West the evil is not so serious on account of the low percentage of population to area, but some of our streams are beginning to show the effects of increasing population, and especially in the growth of towns of considerable size upon their banks. In the more densely populated districts of our Eastern States, and especially in parts of Europe, many of the streams are already hopelessly polluted, and the subject is eliciting the anxious consideration of sanitarians.

It is certain that until some method can be devised to utilize sewage, the offal and refuse of manufactories, slaughter-houses, and distilleries, streams must be the channels through which waste products may escape.

The objections to the use of the water of streams as a beverage are: the high temperature; its occasional turbid condition after excessive rains; and the great liability to contamination from organic matter and waste products of factories. From the difficulty of supplying large cities from any other source the question resolves itself into the problem of how to secure, under these unfavorable conditions, an adequate supply of wholesome water.

CHARACTERISTICS OF GOOD POTABLE WATER.

Absolutely pure water for domestic use is seldom to be obtained, and even if it could be, is hardly to be desired. Distilled water is unpalatable, having a flat, insipid taste. Indeed, water to be pleasant to the taste must contain in solution certain gases; and is not rendered unpalatable nor unwholesome by the admixture of mineral substances, unless these are in excessive quantity.

Waters which flow over or through granite and gneiss formations, are the purest, yet even these dissolve some mineral substances. The most common of these are the chlorides, sulphates, and carbonates of sodium, potassium, magnesium, and calcium, together with silica and

and of various degrees of abundance. In regard to purity they rank as follows:

1. Springs.
2. Deep wells.
3. Rain-water.
4. Shallow wells.
5. Streams and lakes.

Springs found in suitable localities, and furnishing an abundance of water, are very satisfactory sources of supply. Their advantages are a uniform temperature, and freedom from contamination. Their disadvantages are, their liability to contain in solution an objectionable quantity of substances; as iron, sulphur, salt, etc. When furnishing a large amount of water they can be used to supply numbers of families by conducting the water through pipes to the places of consumption.

Wells are of two kinds—deep and shallow. The first furnishes the purer water, to reach which it is generally necessary to bore through impervious clay. The water is, therefore, thoroughly filtrated in passing from the surface of the ground to the spot reached by the shaft. If too deep, however, as in the case of artesian wells, the water is liable to contain an exess of inorganic matter; as salts of magnesia and lime. Shallow wells, if favorably situated, usually furnish reasonably pure water; but unless care is taken in the selection of the site they will become polluted by organic matter, finding entrance by soil saturation, from surface drainage, or through fissures in the strata of the ground.

It would be commonly supposed that rain-water collected in clean cisterns from well washed roofs would fill all the conditions of purity and wholesomeness; and it would do so were it collected at a distance from towns and villages. But rain-water collected in towns is far from pure. The water in falling carries with it many gaseous and solid substances with which the atmosphere is loaded. Roofs of houses are covered with dust, excrement of birds, fungus growths; and it is impossible, without the most vigilant care, to prevent these impurities from being carried with the water into the cisterns in objectionable quantities. It is asserted, also, with good show of reason, that the softness of the water, though admirable for cleansing processes, unfits it for drinking purposes because the structures of the body are largely supplied from the mineral constituents of water.

Streams and lakes or ponds are placed last for several reasons.

aluminum. Iron is the metal most frequently found. To the presence of these minerals is due that quality of water called hardness. For cleansing purposes it is objectionable; but it is an open question, whether hard or soft water is most beneficial to health. Nearly all water contains, also in solution, more or less of vegetable organic matter, due to the action of water on the vegetable matter over which it flows, or to vegetable growths which live and die in the water itself. Water flowing through peat formation is often highly colored, but is not, on this account, considered unwholesome. It is well known that water of this character is often selected for ocean voyages, on account of its power of retaining its freshness for long periods. In England and Ireland, bog-water is held in high repute for its excellence. So it will be seen that water need by no means be pure to be considered potable. Many of the substances held in solution by water can hardly be regarded as impurities, and their presence, or absence, does not affect the health of the consumer. What, then, shall be regarded as constituting pollution of water?

As has been already remarked, it is difficult to find water entirely free from organic matters; and when these are present to only a slight extent, they do not affect to any appreciable degree the quality. If, however, the organic matter held in solution in water exceeds a certain proportion, it becomes injurious to health, and in still greater quantity, dangerous to life. Of organic matter, the first in point of virulence are the dejections from human sources; and the most virulent of all are those from persons sick with zymotic disease. It has been well established that these diseases are communicated from the dejections of the sick finding their way into the stomach of the well. That water polluted with excrementitious matter alone can originate these diseases has been a matter of controversy, but that water polluted with execrementitious matter from persons sick with certain forms of disease will induce the same diseases, is a fact well established.

It has been argued by high authority that the reason of danger from organic pollution is, not that organic matter is harmful in itself, but that it serves as points of attachment and propagation of germs of septic diseases, and wherever there is organic pollution there also is danger of the presence of zymotic germs.

Second in point of danger is pollution from offal of slaughter-houses, and the refuse of tanneries.

Third, excrementitious matter from domestic animals; and lastly, from vegetable organic matter.

If the presence of decaying products from vegetation poisons the air, and causes malarious diseases, it would seem equally probable that their presence in excessive quantity in water used for drinking would give rise to the same evil.

Turbidity of water by itself can hardly be considered injurious to health, unless the quantity of earth held in suspension be considerable, and consists of clay, in which case constant use may bring on intestinal disturbances and indigestion. Turbid water, however, is liable to contain organic matter in excess, and hence due caution should be observed in its use.

We come now to the methods of preventing contamination of water and of removing impurities when present.

RAIN-WATER.

In many towns of small size, where it is impracticable to build water-works, on account of the expense, or the remoteness of the supply; and when well water contains an excessive quantity of mineral substances, and especially the salts of magnesia, many are driven to depend upon rain-water for domestic use. In the country, where the air is pure, and little dust, it is generally only necessary to cleanse the cistern once or twice a year to ensure sufficient purity in the water, but in towns, as we have already shown, there are many causes of contamination. A great many devices have been adopted to render the rain-water fit for use. The first to suggest itself, is to allow the first flow to escape, until the air, roofs, and pipes are thoroughly cleansed, and not until then allow the water to flow into the cistern. This would necessitate the use of self-acting valves, or of constant surveillance, both of which have been proven to be impracticable.

Another way is to cause the water to flow through walls, or obstructions which should remove objectionable matter, and render the water fit for use. A great variety of materials have been used for the purpose; as brick, porous tiles, vegetable and animal charcoal, compressed sponge, unglazed earthen-ware, sandstone, and spongy iron. Of all these, only two can be relied upon to any extent to remove or destroy organic material; namely, animal charcoal and spongy iron. The only objection to the latter is, that the water becomes more or less impregnated with the iron. One common method is to build a cylinder of brick in the center of the cistern, the water filtering through in sufficient quantity; another, to divide the cistern into two divisions by a brick partition. Sandstone or porous tile may be used for the same purpose. The objections to all these materials are, that they soon become clogged and covered on the outside with a deposit of decaying organic matter, through which the water must pass to reach the inner chamber, and which must necessarily communicate some offensive property to it, or the water is arrested in its passage and the supply ceases. This is the most fortunate result, for it calls attention to the condition of the filter and necessitates removal or cleansing. It is also doubtful if these materials destroy organic matter.

Repeated experiments have shown that the best material for a filter is animal charcoal, used either in blocks or granulated. It has been demonstrated that this material destroys and removes organic matter. Blocks of the animal charcoal may be built up in cylinders, or partitions. A recent device is to attach the filtering box by coupling to the suction pipe of the pump, by which means it may readily be removed for cleansing or renewal. Whichever form of filter is used, it is advisable that it be thoroughly cleansed or renewed once in six or twelve months.

PURIFICATION OF WELLS.

As a large proportion of our population are dependent on wells for water supply, it is of the highest importance that they should learn the danger of pollution, and the most effectual methods of preventing it. We read in our journals of whole families dying in farm-houses of diphtheria, and the community wonders at the cause. Possibly no other cases occur in the neighborhood. With pure water, and pure air, these deaths would not have occurred. I do not think that men willfully disregard the laws of health, but they ignorantly violate these laws, and suffer the penalties of sickness and death.

I have placed wells as the second best source of supply, as regards freedom from organic pollution, when made with due regard to situation and surroundings.

Wells are of three varieties:

First—Those which are dug through deposits of soil, sand, and pervious gravel, until they reach a stratum of impervious clay.

Second—Those which penetrate the first stratum of clay, and passing through a bed of gravel or sand beneath the clay, reach another stratum of clay. These we may class deep wells, the first variety being entitled shallow wells.

Third—Artesian wells, penetrating the earth to considerable depth.

In wells of the first kind, the supply of water may at first be clear, bright, and sparkling, and reasonably pure. It undergoes a process of filtration, oxidation (because porous soil contains considerable air), and sedimentation, the earthy and organic matters being filtered out and destroyed in the slow passage of the water to the water-level of the well. But the householder is generally guided only by convenience in the location of his well. It is usually in the rear of the dwelling, in close proximity to the kitchen. The barn, the privy, and the cess-pool, if such there be, are also conveniently located near the house, and also near the well. Generally, no regard is taken of the slope of the barnyard or of the direction of the stratum of clay upon which the well rests. Excrementitious matter from the barnyard, or the refuse of the kitchen are washed into it; the contents of the cess-pool or privy gradually saturate the soil in an ever-increasing area, until they reach the well. It is not necessary to the contamination of the water that the area of soil saturation should reach the well. As water is drawn from the well, there is a movement of the water in the surrounding soil to fill up the void, therefore surface water passing through the area saturated with the organic matter will dissolve this matter and carry it into the well. After heavy rains it has been noticed that the water of shallow wells is more than ordinarily impure. In towns and villages, the probability of pollution is much increased, owing to thè greater contiguity of cess-pools and privies to the well, and the greater quantity of refuse matter upon the surface.

WHAT ARE THE REMEDIES?

First—To lay the upper part of the well in cement, so as to exclude surface drainage.

Second—To pay due regard to the slope of the impervious bed, so that the direction of the underground flow should not be from the privy and barnyard toward the well.

Third—To place privies, cess-pools, etc., at a sufficient distance (not less than one hundred feet) from the well, so that if any organic matter reaches the well it will be so much diluted as to be innoxious.

Another means of safety is frequent cleansing of privy vaults and cess-pools, and disinfection of their contents. Slops should not be thrown near the well.

The question will be asked: What distance from deposits of filth should the well be placed to insure non-pollution? It depends somewhat on the nature of the soil, and the direction of the impervious stratum beneath. Instances, well authenticated, are reported of the contents of privy vaults polluting wells situated a hundred feet from them. Usually, however, a distance of sixty or seventy feet insures non-pollution.

The water of deep wells, or such as derive their supply from underneath an impervious stratum of clay, and which penetrate a water-bearing bed of gravel or sand—this kind of well is less liable to contamination than the first, because it usually derives its supply of water from a distance, provided the surface, or ground water, does not obtain entrance. If the surface soil is clay, no precautions are necessary, except to raise the mouth of the well above the surrounding level. But if the well is first sunk through sand, or gravel, the wall should be well laid in cement above the first seam of clay. Occasionally, however, there is danger of organic matter reaching the well through fissures in the clay, and especially the kind known as joint clay. If this is suspected, the privy, or cess-pool, from which the filth comes, should be removed to a greater distance, and in a different direction from the well.

A new method which obviates many of the ordinary risks of pollution is called the drive-well system, familiar to every person in the Western States. The pipe being impervious to water, except at its lower end, no impurities can find entrance, save such as are present in the water-bearing stratum to which it penetrates. If sunk through surface sand, or gravel, to the first layer of clay, the water is equally liable to contamination, except from surface drainage.

A system for supplying water to towns of moderate size, situated on the margins of streams and ponds, has been practiced in Europe, and to some extent in this country. This consists in sinking one or more large wells near the bank of the stream, or pond. These wells are not supplied, as might be supposed, from the river or lake, as experiment has proved that the water will not filter through the bank in sufficient quantity, and attempts to obtain a sufficient supply from this source have proved a failure. Where, in the vicinity of a river or pond there is a sufficiently pervious soil, and especially where the land rises gradually from the river there is a body of ground-water moving slowly, and regularly, to the bed of the stream—if a well is sunk into this water-bearing soil, it intercepts and receives a portion of the water. A sufficient number of them, connected by galleries, would undoubtedly furnish a large quantity of water. The quantity would be affected, however, by the porousness of the soil, its angle of declivity, and the amount of rain-fall. To supply a town from this source, the minimum amount entering the wells can only safely be calculated on. A well of this kind, sunk on the banks of the Elbe, where the soil was very porous, furnished 600,000 gallons every twenty-four hours. The pumping was so conducted as to keep the water in the well eight feet below its normal level.

The question has been raised whether the supply for the city of Des Moines could not be furnished from large pits sunk near the banks of the river, under the supposition that sufficient water would pass from the river into them to supply the city, but experiments of this kind, as before stated, have proved a failure. It is possible, however, that a sufficient quantity could be furnished from the ground-water moving toward the Raccoon River from the heights and along the bottom-lands. Waltham and Cambridge, in Massachusetts; Toulouse, Lyons, Nevers, and Blois, in France; and Dresden, in Saxony, are supplied in this manner. The water collected in this manner, or by natural filtration, as it has been termed, is generally harder than river water, but more free from organic matter; yet if this ground-water passes under a densely populated neighborhood, it is liable to pollution from percolation from privies, cess-pools, and other collections of filth existing in said locality.

RIVERS AND LAKES.

We come now to the examination of the water of rivers and lakes, and especially of the first named, as the source of water supply. Many of the large towns of this State derive their supply of water from this source, or are preparing to do so. Are the waters of our rivers of sufficient purity, when taken directly from them, to be healthful? or do they need some method of purification to render them fit for use? I have already stated the causes of pollution of river water. Many of these are not as operative in our State as in some others; yet, with the rapid increase in the number of slaughter-houses, soap manufactories, rendering establishments, and sewerage from large towns, the danger is increasing yearly. The source of pollution is also a most dangerous one; namely, animal organic matter, a large proportion of which is in process of decomposition. A very small quantity of this matter in water renders it inimical to health.

SELF-PURIFICATION.

There are three modes of self-purification of river water; namely, sedimentation, dilution, and oxidation. In addition, a certain amount of animal matter is consumed by fishes; a favorite place of resort for them being at the mouths of sewers. Aquatic plants also take up and assimilate considerable portions of organic matter.

SEDIMENTATION OR DEPOSITION.

Much of the waste matter thrown in streams is insoluble in water, and either sinks to the bottom, or is deposited on, or along the banks. Earths held in suspension are disposed of in this manner, so that a stream which is very turbid after heavy rains, soon becomes clear.

DILUTION.

This mode of self-purification is the diffusion of waste and excrementitious matter through the large mass of water, to such an extent that it becomes inappreciable to chemical tests. Sewerage, animal and vegetable matter, waste from factories, coloring matter from dye houses poured into rivers in quantities sufficient to render the water wholly unfit for use, are in the course of a few miles so largely diluted as to be probably innoxious. I say probably, for the reason that sanitary science has not yet determined to what extent polluted water must be diluted to render it fit to drink. Although a certain proportion of organic matter is destroyed by contact with air and light, and is consumed by fishes and plants, yet more or less still remains in the water for an indeterminate period.

OXIDATION.

It is undoubtedly true that in running streams, organic matter of certain kinds decomposes rapidly, and changes into harmless substances. Others are less easily decomposed, as muscular fibre, which may remain for months in water and still be recognizable under the microscope.

All water holds a certain amount of air, and in swift running streams the water is pretty thoroughly mixed with the air, and its oxygen unites with the organic matter in the stream, forming new combinations of nitrates, nitrites, and carbonic acid. Many examinations of the waters of streams have been made with a view to determine the degree of purification within a certain distance from the source of pollution. This largely depends upon the width, depth, velocity of current, number and size of affluents, rain-fall, etc. The Mississippi would so quickly dilute and oxidize the sewage and excrementitious matters discharged into it from cities like Dubuque, Clinton, Davenport, Burlington, and Keokuk, that at a short distance below, the water would be apparently as pure as above them. While the same cities, on much smaller streams, would contaminate the water for a much greater distance. Of these examinations I append a few, as illustrative of the effects of dilution and oxidation. The following is taken from the *Chicago Tribune:*

EXCRETION IN THE RIVER.

"There is some discussion and inquiry as to the purity of river water from which cities are compelled to seek supplies. Nearly all cities empty their sewers, reeking with excretion, into adjoining rivers, by which it is floated through smiling valleys to other cities below. The natural view of the case would be, that it is injurious to the health of the country through which it passes, and that no city lower down the stream could use the water with safety to health. But science and observation have thrown light on this important question. To quiet some minds the following is given, from the *Boston Journal of Chemistry,* May 1:

"Ten years ago we published in the *Journal* the results of several careful analyses of the waters of Merrimac River in eastern Massachusetts. These waters were taken from the river at Haverhill, a point some eight miles below the last of the great manufacturing cities which line the banks of the river almost to its source. The cities of Lawrence with 40,000 inhabitants, Lowell with 60,000, Nashua with 15,000, Manchester with 50,000, are all upon this famous stream, and the excreta and filth of at least a half million of people, and the refuse from hundreds of immense mills, are poured into it constantly, day and night throughout the year. The waste from the mills is not only of a filthy nature, but a considerable portion consists of substances highly corrosive and poisonous; as acids, spent dyes, mineral salts, and caustic alkalies. The Pacific Mills at Lawrence are of vast extent, the largest in the world, employing about six thousand operatives, and the filth coming from this establishment would seem to be sufficient almost to poison the waters of the Atlantic Ocean. The waters examined were secured at a point, as had been stated, not more than eight miles below the outlet from these mills into the river, and at the season (July) when the stream is at a stage of water half way between its maximum and minimum flow. The analysis showed a high degree of purity in the water, the organic and inorganic matter falling below four grains in the imperial gallon. 'Results of this nature, so unexpected, created doubts as to the accuracy of the methods of analysis, but they were fully sustained by repeated testing under all the modified forms known in chemical research.

"'Standing alone, these results would serve to show the remarkable capability moving water possesses of self-purification; but the fact is strongly established by researches in England made upon the streams which are polluted by wash from the large manufacturing towns and cities. The streams in England are small, there not being one of so great a volume as the Merrimac, which we regard here as a small river. The pollution of English streams is carried to an enormous extent, the water of many, at the outfall of the sewers of large towns, being actually offensive; as it passes down the river it blackens from formation of sulphide of iron; further on the black color decreases, disappears, and the river at last exhibits no signs of odor, color, or turbidity. Again, soon after the sewage has been turned into the river the sewage fungus appears; the banks are black. A short distance further the fungus vanishes, vegetation is luxuriant, fish abound, the river clears, and no trace of black deposit can be seen. Thus the river Soar at Leicester is black with sewage. At Loughborough, thirteen miles distant, the water is perfectly clear and fish are abundant. The Irwell at Manchester is polluted with every form of filth; in nine miles the offensive character of the stream has entirely disappeared; and so in many cases.

"At no time and under no circumstances have the waters of the Merrimac became so impure, even at the point where they flow through cities, as to destroy life. Fishes in considerable numbers are found in the river at all seasons, and in the spring, shad, salmon and alewives abound.'

"Great alarm was felt in Chicago a year ago because of the bad condition of the water obtained from the lake. The enormous amount of filth carried by the river into the lake had seriously contaminated the water as far out as the crib from whence the water used by the city was obtained. Examinations of lake water at various points were made to ascertain the area of pollution. The following is the report made by the chemist of the Health Department:

"A full report of the analysis of samples of water recently taken from the lake was made by Professor Paton, the chemist of the Health

Department on yesterday. It has been already stated in the *Times* that the professor found indications of decomposing animal matter in the water, but it was not then known from what points the several specimens were obtained. The complete report as now submitted is important as showing very satisfactorily where water may be obtained from the lake with the least liability to contamination by the city sewage.

"It shows that during the late period of high water in the river the lake was certainly contaminated at and about the crib. This contamination was greatest, at the time the samples were obtained, a quarter of a mile southwest by south of the crib; next, in the well of the crib, and the contamination seemed to grow less as the distance east or north of the crib became greater. It does not follow that the contamination was wholly from sewage—for some reason no samples seem to have been taken from the lake between the crib and the mouth of the river—but it would be difficult to convince those who drank of the water that it came from any other source. Samples were taken at varying distances from the shore as far north as Highland Park, twenty-two miles from the city. In these only small traces of free ammonia and little albuminoid ammonia were found. The water seemed to grow purer the further north the samples were taken, after passing the outlet of the Fullerton Avenue conduit.

"The following table gives some of the results. Samples were taken both from the surface and at or near the bottom of the lake at the point indicated. The figures relate to the samples taken from the bottom. The analysis of the surface water varied slightly. The impurity of the water is indicated by the amount of ammonia it contains:

WHERE TAKEN.	PARTS PER MILLION.	
	Free ammonia.	Albuminoid ammonia.
One-fourth mile southeast of crib	.36	.42
Well of crib	.32	.22
One-fourth mile east of crib	.16	.10
One mile east of crib	.10	.03
Two miles east of crib	.06	.07
One-half mile east of conduit	.07	.18
Two miles off Evanston Pier	Trace.	.08
Two miles off Grosse Point	.06	.11
One mile off Highland Park	.02	.11
Two miles off Highland Park	Trace.	.06

I also quote from the reports and papers of the American Public Health Association to show the effects of dilution and oxidation in the purification of even greatly polluted water:

THE SPONTANEOUS PURIFICATION OF RIVER WATER.

While the animal matters which find their way into wells from cess-pools and privies are capable of producing the fatal results to which I have called your attention, it is now well settled that such matters are speedily oxidized, and destroyed, and thus rendered harmless, when they flow into running streams, by the oxygen held in solution in the water. Dr. Alfred Taylor stated before the Parliamentary Commission that "organic matter in water is only offensive while in process of decay; when this operation is completed it ceases to be offensive.

Sewage which would poison an ordinary well becomes harmless in the running stream, and while the well is always open to suspicion, the river, though it drain populous districts, will, nevertheless, supply wholesome water. Having recently had occasion to study this question in connection with the project for supplying the city of Albany from the Hudson River, I have collected some facts and opinions which I will present to you as embodying the views of the most recent.

Dr. Frankland, in an article for the *Quarterly Journal of Science*, says:

The population in the basin of the Thames, above where water is taken, is 1,000,000, the drainage of some 600,000 of whom is poured into the river; the sewage is so thoroughly oxidized that no trace of it can be detected in an unoxidized state. The average flow of the river at the point where the companies take their supply is 800,000,000 gallons daily. The sewage contained would be $\frac{2250}{100000}$.

The Royal Commission reports as follows:

But though for these reasons we believe that the organic contamination of the Thames is much less than is commonly imagined, still it would be sufficient to do great mischief were it not for a most beneficial provision of nature for effecting spontaneously the purification of the streams. Some of the noxious matter is removed by fish and other animal life, and a further quantity is absorbed by the growth of aquatic vegetation; but, in addition to these obstructions, important changes are effected by chemical action. The organic compounds, dissolved in water, appear to be of very unstable constitution and to be very easily decomposed, the great agent in this decomposition being oxygen, and the process being considerably hastened by the motion of the water. Now, as such waters always contain much air dissolved in them, the decomposing agent is ready at hand to exert its influence the moment the matter is received into the water; in addition to which the motion causes a further action by the exposure to the atmosphere, and when (as in the Thames) the water falls frequently over weirs, passes through locks, etc., causing further agitation and aeration, the process must go on more speedily, and more effectually. The effect of the action of oxygen on these organic matters, when complete, is to break them up, to destroy all their peculiar organic constitution, and to rearrange their elements into permanent inorganic forms, innocuous, and free from any deleterious quality. This purifying process is not a mere theoretical speculation. We have abundant practical evidence of its real action in the Thames and other rivers.

The following is the testimony of Sir Benjamin Brodie, Professor of Chemistry in the University of Oxford:

Oxidation is constantly going on in the soil and in the river; and, therefore, there must be some point at which the perfect destruction or oxidation of its animal matter must take place. What I think is much more important still, is another point; namely, the great dilution of the material; and I should rely upon the dilution quite as much, and more, than upon the destruction of the injurious matter. Supposing the sewerage of a large town, as Oxford, pouring into the river, there are numerous feeders and tributary streams to the river, which effectively dilute the sewerage. The sewerage is gradually getting less and less, and, therefore, its noxious character diminishes and ultimately disappears.

Testimony of Dr. Parkes, Professor of Military Hygiene of the Army Military School at Netley:

Q. Have you observed, in a case where sewerage has been discharged into a river, that after running three or four miles the effect of the sewerage has been destroyed?

A. Yes, we have; that in the case of the Southampton water supply. Some sewerage passes into the Itchen River, but it is quite destroyed by the time the water is distributed in Southampton; at least there is no detectable quantity.

Q. What is the distance?

A. The distance is six or eight miles. I could not undertake to state the distance in which water would purify itself in that way, but there is no doubt that it does purify itself, although in what distance, or in what time, or under what precise circumstances, I could not say.

Testimony of Mr. Leach, Engineer to the Thames Conservancy Board:

Q. How soon, in your observation, is the effect of sewerage destroyed by its flow and admixture with the water?

A. At Windsor, it is discharged into a most unfavorable point in the river, where there is little or no stream at ordinary times. The matter which is passed out of the drain, floats about in the river there to a very great and very disgusting extent. Two miles, or even a mile below, I could find no traces whatever of the sewerage.

Testimony of Mr. Hawksley, Vice-President of the Institute of Civil Engineers:

Q. You remember, do you not, the original condition of the river at Leicester, after receiving all the sewerage of the town into it?

A. Yes, perfectly well; at Leicester the water was as black as this ink. I do not mean to say that it was absolutely so thick, but looking at it in a mass, it was as black as ink; nothing would live in it, and the smell was abominable; but by the time it got to Loughborough, twelve miles below, it was entirely restored to its pristine condition; you could stand on the bridge, there, and see the fish swimming among the beautiful reedy and other plants growing in the water, just as in the purest streams; you could see every pebble at the bottom; that is an instance of the effect of oxidation.

Testimony of Dr. Letheby, Medical Officer of Health in the Corporation of London:

Q. Taking the case of the cholera disease, and the discharges from the human body being mixed up with the sewerage, do you consider that any germs of that disease would be carried down in water?

A. At the present moment, we do not know what the germs of disease are; if the germs of the disease be decomposing matter, then I do not think that they exist in the water; but if the germs of the disease be living matter, then it is possible that they may exist in the water; but as nobody, as far as I am informed, can tell us what the germs of cholera are, it would be premature for me, or anybody, to theorize as to the probability, or the possibility of their existing in the water.

FILTRATION OF RIVER WATER.

The waters of Western rivers contain after heavy rains so much earthy and vegetable matter in suspension, that they are unfit for domestic use unless filtered. Different methods are in use to accomplish this purpose. The method practiced by the water company at Des Moines is, to sink iron cylinders, open at the bottom, in the channel of the river, and into the sand and gravel ten feet or more, the water being filtered by passing up into the cylinder through the stratum of sand and gravel at the bottom of the river. This method proved successful while the demand for water was limited, but at present fails to furnish clear water to the city, by reason of the want of capacity of the filtering chambers. Immediate steps will be taken to sink additional cylinders, when it is believed that a sufficient supply of clear water will be furnished to meet all demands.

Another method is, by passing the water over filtering chambers, the chambers being constructed of stone laid in cement, ten feet in depth, of length and breadth to furnish an ample supply of water. On these chambers is constructed the filtering bed.

In building this up, provision is first made for the ready collection of the water, by constructing upon the floor of the basin from which the water is to be filtered, into the chambers below, channel ways of stone or brick, laid dry; then follows a layer of broken stone, of three or four inches in diameter. This is succeeded by gravel, screened so as to be of uniform size (a layer of coarse being followed by one or more of smaller size); upon the gravel are placed layers of sand of different degrees of fineness. The filtering bed at Poughkeepsie, New York, has a total thickness of six feet. The water flows over this bed to the depth of three or four feet.

The objection to this method is the necessity of frequent cleansing of the filter-beds. The more turbid the river the oftener must this be done. In the worst stages of some rivers, this has to be done as often as once a week. Another objection is the liability of the water in the basin to freeze to a great depth in severe winters.

Still another method of purifying water is storing it in large reservoirs, when the stream is clear, and drawing from this supply when the river is turbid.

LEAD POISONING.

Another and dangerous source of contamination of water, and especially of river water, arises from the use of lead pipe to conduct the water from the street mains to yards and houses. The oxygen in the water acts upon the lead, forming compounds which are injurious to health when taken into the system. Soft water is contaminated much more rapidly than hard, for the reason that the mineral constituents of the hard water soon form an impervious coating on the inner surface of the pipe. The water of Iowa rivers holds in solution considerable quantities of mineral matter, and lead pipes become speedily encrusted with them, especially with the sulphate of lime. Care, however, should be taken to allow the water to run long enough to discharge the water standing in the service pipe, before drawing for domestic use.

PURIFICATION OF WELL WATER.

When the water of wells is once polluted by the contents of cess-pools, or privies, it is difficult, or, I may say, impossible to purify it. Oxidation can do but little on account of the small amount of air held in suspension, and the limited exposure to the external atmosphere. Purification by dilution is evidently impossible. The only methods of purification are, by boiling, or filtering through animal charcoal, and it is doubtful if the latter mode is perfectly safe.

When a well is found to be polluted except from surface drainage, it should be filled up and a new one dug sufficiently distant from sources of contamination to insure pure water.

TESTS OF THE QUALITY OF SOIL WATER.

The Secretary of the State Board of Health of Michigan reports the following:

The question of the fitness or unfitness of soil water for domestic use can be absolutely determined only by a careful chemical analysis. But many persons who would not wish to incur the trouble and expense of a chemical analysis will yet desire some popular means of testing the water they use. The following methods of testing such water are presented, not as the most complete possible, but such as anyone can supply without the skill and appliances of the practical chemist. If such tests cast suspicion upon the quality of the water, and especially the water appears to cause sickness in any one using it, the water should be changed, or else a careful analysis should be made by some competent chemist.

Color—Fill a bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or turbid appearance indicates the presence of soluble, organic matter, or of solid matter in suspension. It should be "clear as crystal."

Odor—Empty out some of the water, leaving the bottle half full; cork up the bottle and place it for a few hours in a warm place; shake up the water, remove the cork and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling an odor is evolved sometimes that otherwise does not appear.

Taste—Water fresh from the well is usually tasteless, even though it may contain a large amount of putrescible organic matter. Water for domestic use should be perfectly tasteless and remain so, even after it has been warmed, since warming often develops a taste in water which is tasteless when cold. If the water, at any time, has a repulsive or even disagreeable taste it should be rejected.

Heisch's test for sewage contamination.—The delicacy of the sense of smell and of taste vary greatly in different individuals; one person may fail to detect the foul contamination of a given water, which would be very evident to a person of a finer organization. But if the cause of a bad smell, or taste, exists in the water, the injurious effects on health will remain the same whether recognized or not. Moreover, some waters of very dangerous quality will fail to give any indication by smell or taste. For these reasons I attach especial importance to Heisch's test for sewage contamination or the presence of putrescible organic matter. The test is so simple that anyone can use it. Fill a clean pint bottle three-fourths full of the water to be tested, and dissolve in the water half a teaspoonful of the purest sugar —loaf or granulated sugar will answer—cork the bottle and place it in a warm place for two days. If in twenty-four to forty-eight hours the water becomes cloudy or muddy it is unfit for domestic use. If it remains perfectly clear it is probably safe to use.

OUTBREAKS OF ZYMOTIC DISEASES CAUSED BY USE OF POLLUTED WATER.

From the reports of the Massachusetts Board of Health of 1871 and 1876:

A somewhat extensive though mild epidemic of intestinal and gastric disease occurring in a hotel at Rye Beach, New Hampshire, was traced to the use of impure ice. The ice was taken from a pond in which was found a mass of decomposing material composed of marsh mud and sawdust. The water near this emitted an intolerable effluvium when stirred, and analysis showed a dangerous quantity of organic matter. On ceasing to use the ice the epidemic disappeared.

In December, 1865, typhoid fever appeared in Pittsfield, in a family of about forty persons, a boarding school for boys. The head of the school, and four boys, died. Eight or ten other cases recovered. The surrounding community was healthy. In this family, the water used was from a well under the wash-room. The drain from the wash-room was obstructed, and the foul water found its way under the floor, and into the shallow well. The well was closed, the family supplied with water from another source, and the fever subsided.

In illustration of the effects of drinking water made foul by decomposing organic matter, the following instructive facts are related by our correspondent at Sutton:

A large house in this village is supplied with water from a well in the front yard, three rods from the house. Connected with the house is a barn, without cellar, some three rods from the well. In December, 1868, a trench, three or four feet deep, was dug from the well to a point near the middle of the barn, where a pump was set, and a pipe connecting it with the well was laid in the trench; after which the earth, which was in large, frozen chunks, was filled back into the trench. In the house was kept a boarding-school for boys, of whom there were ten or twelve. Three little girls were also there, aged twelve, eight, and three years, belonging to the family of the owner of the house; there were, therefore, fourteen or fifteen children who drank from the well. The oldest boy was seventeen or eighteen years old, while the others were of ages from ten to thirteen. Everything went well until after the thaws in February and March, 1869, when the water had a decided taste and smell of stable-manure. March 26th one of the boys, thirteen years old, was seized with typhoid fever; another, twelve years old, on the 31st of March; another, eleven years old, April 2d; another, ten years old, April 4th, and another, twelve years old, April 9th. April 20th, one of the little girls, eight years old, was seized. Each of these six children (all of whom finally recovered) drank water with their meals, from the well in the yard. Some of the older boys drank coffee in the morning, and tea at night. The manner in which these children were attacked, and the fact that this house had been free from typhoid fever for many years, and the water heretofore known to be very pure and wholesome, leads me to the conclusion that the use of the water thus impregnated was the cause of the disease occurring where, and just at the time it did. My theory is, that while the ground, manure, etc., were frozen, the water was all right; but when it thawed, and the previously frozen filth leached through the soft and loose earth along the track of the pipe into the well, the effect of the poison was felt most perceptibly by those who used the polluted water most freely, while those who used it less freely escaped entirely.

Our correspondent from Worcester says:

When I first came to Worcester there was a row of privies in Maple Street which drained into the wells near by, and typhoid fever raged until the use of the water was discontinued.

POLLUTION OF WATER FROM GRAVEYARDS.

Statements taken from the report of the Secretary of Michigan State Board of Health:—

Unfortunately, we need not go to France to learn what is the influence of graveyard water on the public health. In February, 1875, I received a letter from Dr. Chapman, of Grand Rapids, calling my attention to the serious sickness which had prevailed in families living on a certain alley in that city. From this letter I gather the following facts: There is a graveyard in Grand Rapids called the Fulton Street Cemetery. The soil in this cemetery to the depth of ten to fifteen feet is gravelly and sandy, and beneath this porous soil is a tenacious clay which dips to the east, toward the alley, on which are ten houses. The people living in these houses derive their water from wells, which penetrate two or three feet into this clay. In seven of these ten houses, severe sickness of a typhoid or typho-malarial type prevailed, the sickness lasting from fifteen to thirty-five days. In the family which has lived the longest on the alley, of six persons, five had the fever, three of them in a very severe form. Some of the wells were not more than twenty feet from graves. The impervious clay here served as a water-shed to convey the filtration of the graves directly into the wells, and these poor people were drinking a *cold infusion of death!*

ANALYSIS OF IOWA WATER.

I sent circulars some months since to superintendents of water-works in the State containing the following list of questions. Nearly all replied:

DES MOINES, June 10, 1880.

DEAR SIR—The State Board of Health desire information regarding the water supply of cities in this State. Will you answer the following interrogatories relative to your city?

1. What is the source of water supply?
2. Is the water filtered before entering pipes?
3. Are there any sources of contamination above the main pipes, as sewage, drainage from woolen-mills, slaughter-houses, etc.? If so, of what nature?
4. Has any analysis of the water been made? If so, give it.

Any other statements regarding your water supply, its purity, etc., will be thankfully received.

Very respectfully,
W. H. DICKINSON.
Committee on Water Supply.

I also requested the health officers of cities which have water-works to send samples of river and well water to Professor Pope, of the State Agricultural College, for analysis, together with such facts relating to possible or probable contamination of the water as he could obtain, such as characters of soil, depth of well, location of cess-pools, privy vaults, etc., and pollution of rivers from excrementitious and other matter, character of bed, banks, etc.

The results of the analyses and the statements of health officers and superintendents of water-works, are herewith submitted:

ANALYSES OF IOWA WATER.*

RIVER WATER.

LOCALITIES.	Free ammonia.	Albuminoid ammonia.	Chlorine.	Suspended matter.	Solid residue on evaporation.	Loss on ignition.	Total inorganic, or mineral matter.	Hardness in gr's per U. S. gal. of 58.328 gr's.
1. Mississippi, Burl'n..	0.00080	0.01800	0.1691	8.9241	21.5396	2.4381	19.1015	6.22
2. Mississippi, M'c'tine	0.00230	0.01280	0.1166	0.8457	8.2825	2.5081	5.7744	5.81
3. Mississippi, Dav'p't.	0.00510	0.01760	0.0786	1.7731	13.7070	1.8314	11.8756	7.47
4. Mississippi, Clinton.	0.00155	0.02331	0.2740	6.4160	15.6780	2.5420	13.1350	5.81
5. Iowa, Marshalltown	0.00130	0.00990	0.0729	2.6830	16.9151	1.9831	14.9320	11.62
6. Iowa, Anamosa....	0.00340	0.01100	0.1048	....	....	....	....	5.39
7. Cedar, Cedar Rapids	0.00000	0.01200	0.0991	3.6863	14.1153	1.9014	12.2139	9.13
8. D. Moines, Ott'mwa	0.00230	0.02330	0.1604	22.2462	33.9468	3.7329	30.2139	4.56
9. Raccoon, Des Moines	0.00150	0.00750	0.1137	0.2041	9.1574	0.6766	8.4808	8.30
10. Missouri, C Bluffs..	No	report	rece'ed					

SHALLOW WELL WATER.

All wells not sunk below rock formation, or impermeable bed of clay, are deemed shallow wells.

11. Marshalltown......	....	....	15.0743	....	60.9527	......	52.2320	43.98
12. Anamosa (E. Booth)	....	....	3.8903	....	32.3137	......	25.6643	21.58
13. Anamosa..........	....	.....	1.2043	....	15.6319	......	12.1613	8.30
14. Ced. Rapids (2d w'd)	....	....	5.0220	....	55.2366	......	49.3454	20.41
15. Ced. Rapids (1st w'd)	....	....	9.4374	....	65.8523	......	56.0533	31.85
16. Ottumwa..........	....	....	4.0946	....	34.2385	......	30.0389	17.01
17. Clinton...........	0.01920	0.04720	1.0980	....	32.8960	......	26.9470	26.56
18. Burlington........	....	....	5.1037	....	50.4537	.....	43.7450	46.89
19. Des Moines........	0.00120	0.00260	3.5405	....	49.6711	......	43.8393	39.84
20. Des Moines........	0.00310	0.00870	4.4486	....	75.9663	......	69.9003	58.10
21. Davenport.........	0.00150	0.00730	2.8880	....	43.8393	......	40.9229	26.56
22. Muscatine.........	....	....	10.1009	....	54.070	......	46.4874	40.18

DEEP WELL WATER.

23. Dubuque..........	....	....	0.1883	....	13.0071	0.8171	12.1900	17.01
24. Dubuque..........	....	....	0 2182	....	14.8386	1.0149	13.8938	19.09
25. Dubuque..........	....	0.00170	0.2041	....	14.4886	0.9448	13.5438	19.09
26. Dubuque..........	....	....	8.9970	....	41.2378	......	32.8036	34.03
27. Des Moines........	0.00230	0.00230	1.9239	....	48.6398	......	43.0927	39.84
28. Des Moines........	0.00690	0.00350	4.8062	....	42.4794	......	37.6798	31.54

ICE WATER.

29. Mississippi River...	0.01550	0.01130	trace	....	1.3765	0.9449	0.4316	0.
30. Des Moines River..	0.01240	0.00310	trace	....	0.6998	0.2333	0.4666	0.
31. Des Moines River..	0.01390	0 00190	trace	....	0.7582	0.2916	0.4666	0.

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*Analyses made by Prof. T. E. Pope, of Iowa State Agricultural College. The results are expressed in grains per U. S. gallon of 58.328 grains.

WHERE SAMPLES WERE COLLECTED.

RIVER WATER.

WATER-WORKS, BURLINGTON.

1. Source of supply, Mississippi River; distributed by Holly system; water filtered before entering the pipes; no source of contamination above main supply. Sample collected June 24.

WATER-WORKS, MUSCATINE.

2. Distance from source to point where sample was collected 1,100 feet. Two streams, having several slaughter-houses on their banks, enter the river above the water-works conduit pipes; also several sewers. An iron conduit pipe projects 700 feet into the river, fourteen feet below low water mark, through which the water is pumped into the reservoir which supplies the street mains. Sample collected June 24.

WATER-WORKS, DAVENPORT.

3. Sample collected August 13, from hydrant supplied by waterworks. The water is taken from Rock Island Rapids, about one-half mile above the termination, where the current is very strong, by means of conduit, which runs some distance out into the river. No filtration.

WATER-WORKS, CLINTON.

4. Sample taken from hydrant at Lee's drug store, corner Fifth Avenue and Second Street, September 6, 1881. Water is pumped from Mississippi River. The conduit extends far into deep, quick current, and before reaching the pumps passes through two feet of sand and gravel. No contamination above the works except ordinary surface drainage. The city sewers are all below the pumping works.

WATER-WORKS, MARSHALLTOWN.

5. Supplied from Iowa River; water pumped into reservoir, which supplies street mains. Sample collected from hydrant, June 18. Water is filtered. No sewerage or other animal polluting matter known to gain access to the river above the water-works conduit pipe.

WATER-WORKS, ANAMOSA.

6. Water pumped into reservoir. Sample taken from hydrant June 22.

WATER-WORKS, CEDAR RAPIDS.

7. Water pumped into street mains direct through conduit pipes which enter the river above the city. Water not affected by anything except ordinary surface drainage. Street mains also supplied in part from a well. When water is drawn from the well, it is filtered. Samples taken from a hydrant, July 6, but whether it is from the river or well is not reported. The analysis indicates it is from the river.

WATER-WORKS, OTTUMWA.

8. Water is pumped into a reservoir, which supplies the street mains. Samples taken from hydrant on Main Street June 29. Several packing and slaughter-houses, from which the offal enters the river, about a half a mile above the pumping works.

WATER-WORKS, DES MOINES.

9. Supply taken from a filtering tank fourteen feet below the bed of Raccoon River, and pumped directly into the street mains by the Holly system. Sample taken from hydrants one-half mile from the river July 16. No contamination of water above the source of supply by sewage, manufactures or slaughter-houses.

10. No report.

SHALLOW WELL WATER.

11. Well fourteen feet deep; soil, loam; subsoil clay, yellow, friable, and porous; water-bearing strata is gravel and sand. Sample taken June 24.

12. E. Booth's. Depth, thirty-five feet; walled with stone.

13. J. C. Deitz. Same as No. 12.

14. Located in the Second Ward. Depth, sixteen feet; diameter three and one-half feet; cribbed with pine lumber, and walled with stone inside of cribbing, black loam six feet; yellow sand eight feet; coarse gravel and sand water-bearing strata two feet; several privy vaults eight feet deep, fifty to sixty feet distant; water raised with an iron pump. Sample collected July 6.

15. Located in First Ward, half mile distant from foregoing No. 14, and 400 feet from the river; livery stable directly in the rear;

nearest privy fifty to sixty feet. Soil and depth the same as No. 14, except the loam which is only a few inches in depth; more water drawn than from any well in the city. Samples collected July 6.

16. Depth twenty-five feet; water raised with a bucket; location on fourth street from the river, at the foot of the bluff; soil drift; no contamination by sewerage, drainage, or surface water. This well is one of the oldest in the city, and a fair sample of the natural water of the city.

17. Clinton. Sample taken from school-house well between Sixth and Seventh Avenue, Fourth Street, September 6, 1881.

18. No description received.

19. Driven well on bottom-land, corner of West Sixth and Market streets. Soil, drift, depth twenty-two feet; an old cellar filled with rubbish twenty feet distant; privy without vault, fifteen feet distant; back of residence fifteen feet distant, where all slops from kitchen are thrown. Sample secured July 19.

20. Location corner of East Third and Elm streets; two blocks from the Des Moines river; open; drift soil; depth of well twenty feet; depth of water five feet; several back doors of residences six and nine feet distant, where kitchen slops are thrown; two privies without vaults forty and fifty feet distant. Sample collected July 19 by lowering glass bottle to the bottom of the well.

21. Open; depth of well twenty feet; diameter four feet; soil, black loam, yellow and black clay and gravel, the latter being on a level with the river bed. The water in this well rises and falls with the river; privies fifteen and twenty-five feet distant. Sample collected August 13.

22. Depth of well twenty-five feet; diameter four feet; distance from drains and cess-pools, sixty feet; soil, clay; subsoil, sand; water-bearing strata, sand and gravel. Sample collected June 24.

DEEP WELL WATER.

ARTESIAN.

23. Depth, 1,600 feet; diameter, six inches; water rises to within thirty feet of the surface. Sample collected July 7.

WATER-WORKS AT DUBUQUE.

24. The supply comes from a tunnel or adit about one mile in length, penetrating the bluffs and running a due west course, varying in depth from the surface from one hundred to two hundred feet, and

sixty to eighty feet below the mineral bearing strata. Much of the distance is through solid rock, with frequent openings and fissures, through which the water is constantly forcing its way and the supply increasing. The tunnel is located about two and a half miles out of the city. A large reservoir about four hundred feet below the mouth of the tunnel, of the most substantial character, fully enclosed with heavy walls, shutting out all surface water, gives a storage capacity of about three million gallons, including the tunnel. The connection is made from a twelve-inch water main leading from the mouth of the tunnel to the city, running parallel with the reservoir and entering at the bottom, thus giving it the effect of a boiling spring. Sample collected July 7, from the tunnel or level.

25. Sample taken from a hydrant July 7, two miles distant from the reservoir.

26. Depth, thirty-five feet, of which six feet are limestone and slate formation.

27. Location, 838 West Fifth Street (F. Geneser); open, tight curb, roofed; brick wall; depth of well, forty-five feet; depth of water, twenty-one feet; soil, alluvial, one and one-half feet; yellow joint clay, twenty-one feet; gravel, one and one-half feet; blue and yellow clay. fifteen feet; sandstone, two and one-half feet; yellow clay, three and one-half feet; street, one hundred feet east, four feet above the mouth of the well; stable and three privy vaults, sixty, forty and thirty feet distant westward; privy vaults, ten feet deep, and bricked loose without drains; descent from the well to privy vaults and stable three to five feet; no slops thrown on the lot. Sample collected July 19, by lowering a bottle to the bottom of the well.

28. Location on Center Street between Fourth and Fifth; open; depth, thirty-five feet; depth of water, ten feet; soil, joint clay; no surface drainage can get entrance; privy vaults, twenty, forty-five. fifty and sixty feet distant. Water raised by wooden bucket. Sample collected July 19, by lowering a glass bottle to the bottom of the well.

ICE WATER.

AT DAVENPORT.

29. From ice taken at Davenport near the river channel in the lower part of the city, and below the city sewers.

AT DES MOINES.

30. From ice taken July 19, from a delivery wagon of Des Moines Ice Company (Grefe); melted by sun heat in a clean, new, earthen jar, and transferred to glass bottle. The ice was taken from Des Moines River above the dam.

31. From ice taken from the delivery wagon of Capital City Ice Company, at Des Moines the same date, and prepared in the same manner as No. 30. The ice was taken from Des Moines River below the dam.

REMARKS.

For the information of the general public, it may be said in explanation of the foregoing table, that the presence of albuminoid ammonia and chlorine in drinking water is regarded with suspicion. Albuminoid ammonia comes from pollution by sewage or excrementitious and vegetable matter. Chlorine is a constituent of common salt, hence, at a distance from sea-water, its presence in drinking water indicates contamination by drainage from privies and stables or urninary sources. According to Frankland, the celebrated English chemist, water containing .55 parts, or grains, or less of chlorine per United States gallon of 58.328 grains, may be regarded as pure and healthful, while water containing 2.7 parts, or grains, or over, should be rejected for drinking purposes.

While this may be true as a general rule, it will not apply strictly to Iowa, where the earth is rich in chlorides and sodium, so that a sample of water entirely free from possible contamination by surface drainage may contain chlorine, and yet not be objectionable for drinking purposes. So, also, as to albuminoid ammonia. What would apply to rivers would not apply to deep and shallow wells. Some rivers are entirely unpolluted by sewerage or manufacturing establishments. It is well known that peat abounds extensively in Iowa. Rivers receiving the drainage therefrom would show the presence of albuminoid ammonia in their water, yet it would not be objectionable for drinking purposes. It is very important, in making an analysis of water, to know the geology and topography of the district supplying the water. In this the collectors of samples sent for analysis have been unfortunately neglectful in obeying instructions given.

The suitability of potable or drinking water for use must be decided chiefly from the proportion of organic matter or elements it contains. In deep well or spring waters, however, little importance is attached to this, for the reason that in such waters the organic elements may be derived from vegetable and not animal sources. Water from deep wells and springs usually shows the smallest amount of organic matter, the thick strata through which the water has passed having destroyed by oxidation most of the organic matter.

Upland surface waters in uncultivated districts are least liable to contamination from animal excreta, the organic matter contained in them being almost entirely vegetable, and usually peat.

Shallow well water is always largely dependent on the surroundings of the well. Such wells are, with few exceptions, polluted by animal matter. The water-bearing strata may be powerful enough to destroy and oxidize much of the polluting matter, but when overtasked, the purification is slight, and the water necessarily becomes, and often is, as unfit for use as that from a common sewer. Of the shallow wells shown in the above, No. 13 comes nearest the standard of purity. All others are objectionable in chlorine, especially Nos. 11, 15, and 22.

Of the different varieties of waters, the best for dietetic purposes are spring and deep well waters. Sample No. 26 would appear to be an exception. Although classed in the deep wells, the analysis indicates an extensive pollution by excrementitious matter, probably through fissures in the limestone rock.

Dr. Charles Smart, in his report to the Medical Director of the United States army, May, 1876, on spring, well and river waters, of the Department of the Platte, says the water examined at eighteen military posts contained free ammonia 0 to .98 parts per 1,000,000; albuminoid ammonia .10 to .98 parts per million. Lodge Pole Creek, of albuminoid ammonia, .19; Black's Fork, of albuminoid ammonia, .20; Douglas's Brook, of albuminoid ammonia, .28. Snow just fallen at Fort Bridger yielded .30 parts per United States gallon of water, had .50 parts per million of albuminoid ammonia, equal to .029 grains or parts per United States gallon of 58.328 grains. The albuminoid and free ammonia in the water of these far western streams, whose sources are clefted rocks, comes from dead vegetable matter along their banks, yet these streams are deemed to be the purest water known. English authorities would condemn them as dangerous. Dr. Smart concludes that where the free and albuminoid ammonia is of vegetable origin, as in most of western waters, .30 parts per million, or .029 grains per United States gallon is allowable.

The inference to be drawn from the investigation of Dr. Smart is, that no definite standard can be made by which to fix potable water for dietetic use, so as to say that a water may contain so much, if it contains more it is bad; for where a certain amount of the same substance in one case indicates a fearful contamination, in another it would be harmless, or indicate only the normal constituents of the water. As has been stated, the geology and topographical surroundings in each case must be considered in deciding the suitability of any water. As a general rule it may be said river waters are the most objectionable from their liability to pollution by the refuse sewerage of towns. They are the natural carrier of all waste matter which in solution can be carried along by the current. No river water should be used for dietetic purposes without thorough and complete filtration.

ICE WATER.

POPULAR IDEAS.

Water from ice is generally considered pure and healthful. The notion that ice purifies itself by freezing is fallacious, and cannot be supported by scientific observation. Organic matter suspended in water would certainly be drunk by any person using the ice in the ordinary method. Ice should never be taken from water which is unfit for drinking purposes. Of the samples given in the foregoing table, No. 29 is objectionable. The other two are remarkably pure. The difference in favor of No. 31, may be accounted for by the fact that the water above the dam is still, having very little current, and therefore holds in suspension more organic matter than the water below the dam, where is a strong current, which together with the rapid plunging of the water over the dam would tend to oxidize or remove the impurities of organic matter in the water.

It should be borne in mind that all the foregoing samples of river water were collected when streams were swollen by floods and the waters turbid.

DES MOINES, IOWA, *November 5, 1881.*

SLAUGHTER-HOUSES.

REPORT OF

P. W. LEWELLEN, M. D.,

CHAIRMAN OF THE

COMMITTEE ON SLAUGHTER-HOUSES,

OF THE

STATE BOARD OF HEALTH.

SLAUGHTER-HOUSES.

MR. PRESIDENT—In attempting to make a report on this subject, I have to regret at the outset the lack of material that I have been able to collect upon which to base a report.

Soon after my appointment to report on this subject, the following circular of inquiry was sent out addressed to the health officer of every local board in the State, relative to the existing condition and apparent effect of slaughter-houses in their respective towns and cities :

Form 6B.]

CIRCULAR OF INQUIRY CONCERNING SLAUGHTER-HOUSES, ETC.

To the Health Officer of ....

Will you please send as soon as possible. in the enclosed directed and stamped envelope, answers to the following questions :

1. Please state the name of your city.
2. How many inhabitants in you city?
3. How many butchers or meat-market men are there?
4. How many places for slaughtering animals?
5. How many animals are annually slaughtered, specifying the number of
    - *a.* Beeves—
    - *b.* Sheep—
    - *c.* Calves—
    - *d.* Hogs—
    - *e.* Other animals—
6. How many butchers do their slaughtering in one place?
7. How are the slaughter-houses situated in reference to the city limits?
8. How are they situated in reference to thickly-settled portions of the city?
9. Are any of the slaughter-houses now offensive to people living near them, or passing them?
10. Have any cases of sickness occurred fairly attributable to such causes? If so, state full particulars.
11. How are the slaughter-houses floored?
12. How are the blood, offal and bones disposed of ?
13. What is the drainage of the slaughter-houses?
14. Does the drainage from any of them go into a sewer?
15. How are they supplied with water?
16 What are the opinions of the men engaged in the slaughtering business as to the comparative economy and convenience of private separate slaughter-houses, and *one* place in which all slaughtering should be done?

FAT-RENDERING AND BONE-BOILING.

17. How many fat-rendering and bone-boiling establishments are there in your city?
18. Are any of them as now carried on offensive to the people?
19. Do they cause sickness?

20. Have any complaints been made in your city as to unwholesome meats being offered for sale?

21. Are the meats now sold in your city properly inspected before being offered for sale?

22. With respect to fat-rendering, bone-boiling, etc., what are the opinions of the men engaged in the business as to the economy and convenience of private separate places, compared with one place in which to do all such work?

A prompt reply is respectfully solicited by

P. W. LEWELLEN,
Member of State Board of Health.

Clarinda, May 20, 1880.

But few of these were carefully and reliably answered, the delay and incompleteness of the reports being most probably due to the fact that the Board was new and its requirements and advantages not well understood or appreciated, even by many physicians.

The circulars were, in very many instances, not answered by a health officer, but the blanks were filled by the city recorder or township clerk and returned; others were answered by a health officer, but evidently from the reports of others, and without any examination on their part at all; one being about as unreliable as the other, and containing but few facts which can be utilized in a report of this kind.

Considering these difficulties under which I have labored, you will readily understand that my report must of necessity be very meager and incomplete.

I now think it would have been better to have delayed sending circulars to the local boards of health until they had more time to organize, and had learned more of the practical workings of the law, and the ends which it sought to accomplish. When this is properly understood I think there will be more sympathy with it, and all will be willing to aid us in securing data, and otherwise assist in enforcing its injunctions.

The importance of the methods employed by butchers in selecting animals, killing, and preparing meat for market is, I am convinced, not fully appreciated by the consumers of meats.

About the only facts of importance which I have been able to gather from the reports mentioned, are relative to the construction of slaughter-houses and the disposition of the offal, and it is apparent that there is urgent need of reform in regard to both.

Generally, slaughter-houses are built of the roughest material and in the cheapest manner possible, floored generally with plank, most frequently with pine, the floor nearly always being raised from one to two feet from the ground, and with no provision for carrying away the blood, which is allowed to flow over and through the floor, which soon becomes saturated as well as the ground beneath, this being left in part to decompose, as no amount of washing will suffice to remove it all after once being allowed to saturate the floor and its surroundings. In addition to this, hogs are kept in adjacent lots, to which the offal is thrown, which, being only partially consumed, the residue is left to decompose in the sun. I should have added in this connection that the water used in dressing animals for market is from wells surrounded by all these contaminating influences and must necessarily be impure.

This a correct description of most, or nearly all, the slaughter-houses within the State limits, so far as my information extends, and when we consider this condition of things existing all through the hot summer months, where from five to a dozen or more beeves are slaughtered per week, beside other animals, it would be hard to imagine that the atmosphere surrounding those places could be other than *rank* and *offensive* to the last degree.

We cannot expect our meats to come to us perfectly clean, pure and wholesome when prepared in such filthy places as these. Its being frequently left to cool in this putrid atmosphere is sufficient of itself to taint and poison it, thus rendering it unfit for human consumption.

In this connection I would call attention to the following communication :

MIDDLETOWN, IOWA, August 10, 1881.

Secretary State Board of Health:

DEAR SIR—The consumption of meat is becoming so great in this country, particularly fresh beef, that I think it very important the matter should be looked after, especially in times when beef-cattle are scarce, that not so many diseased animals are slain.

When we remember that a great many people eat their beef almost, if not entirely, raw, it becomes more important that it should be strictly free from disease.

To demonstrate what I mean I will give a few instances which happened here recently:

Our little town has two meat-markets. One of the slaughter-houses in town and near to my place; the other but a little way off. Hence, I have a good chance to find out what kind of animals are used for beef.

In the spring I saw a butcher from Burlington drive an animal into the shop near me. The next day he came with a wagon and took it away. This was such a surprise to me that I inquired concerning the animal and found that it had some spinal disease. The owner had tried for some time to fit it for beef, and finally succeeded in getting it passable. In driving it to Burlington it gave out when they got here, so they drove it into the slaughter-house and "knocked it in the head to save it."

A few days ago I saw a fresh milch cow go to the shop. Cows being worth more than beeves, I thought I would inquire a little about her. I found she was a good cow, but she took fits, so the owner thought he would sell her.

I have seen several go in that I thought were consumptive. Have seen calves thrown out that were almost matured.

Now, my observations about killing a cow just before she has a calf is about like this: It never pays to kill a healthy cow just before she has a calf, because the cow and calf will always bring more money, but we frequently have diseased cows which will not improve until they become pregnant—this is often noticed in the human—when just so soon as the calf is born they immediately fall off. Hence, they sell just before the calf is born.

You will see I have been somewhat inquisitive. I think it a subject well worth attention. Respectfully,

GEO. F. GIESE, M. D.

The following was clipped from a Maquoketa, Jackson county, newspaper, dated March 26, 1881:

The other day a gentleman of this city went into one of our butcher-shops and procured a piece of hog's liver, which he took home for the family supper. After being cooked it was partaken of by all the family except the wife, and shortly after, with this exception, they were taken violently ill. A physician was summoned, who applied remedies for poison, and they all recovered in a short time. Suspecting the liver as the cause, a portion of it was given to the dog, which in a few moments exhibited the same symptoms. Upon inquiry it was ascertained that the hog from which the liver was taken had been fattened upon the offal at the slaughter-house, and the animal must have been in a horribly diseased condition to produce such effects. Of course we do not expect our readers will now foreswear swine-flesh upon the strength of this disclosure, but it would perhaps be as well for them, in future, to inquire a little into the antecedents of their pork-steaks and sausages before purchasing

It being the duty of local boards of health to prevent injury or annoyance from anything dangerous, offensive, or unhealthy, and to prohibit or remove anything tending to promote disease, it remains for us then to consider the best methods of securing this end in regard to slaughter-houses, and I would urge in this connection the importance of perfect cleanliness both within and without.

The plan of elevating the slaughtering-rooms so that the blood, offal, etc., may be dropped into wagons in the basements, renders the labor of keeping these rooms clean comparatively easy.

Care should be given to securing a favorable location with good drainage.

The following suggestions from the report of the State Board of Michigan, I consider excellent, and would recommend that they be adopted as far as practicable by the local boards of our own State, and their requirements insisted upon:

1st. It is desirable, when practicable, and it is believed to be subservient not only to the convenience but also to the pecuniary advantage of those engaged in the business, that all the slaughtering as well as all the rendering, etc., should be done at one place.

2d. Location of slaughter-houses, which should be located on hard dry land that can be well drained:

a. They should be amply supplied with *clean*, *wholesome* water from springs, wells, or unpolluted streams.

b. They should be floored with a tight, solid floor, of hard wood, or of cement or well-joined stone.

c. The yards, sheds, and close pens should be dry and free from mud and filth, and their sides or walls should be thoroughly whitewashed at least twice a year.

3d. The slaughter-house and all its apparatus should be kept in a neat and orderly manner, free from all offensive smells.

a. When the slaughtering for the day is completed, the sides and floor of the slaughtering-room should be thoroughly washed with an abundance of clean water. No other disinfectant will be required.

b. No animal matter of any kind should be permitted to remain in, under, or near the slaughter-house to decompose or putrefy.

4th. When blood and offal are fed to swine on the premises, such arrangement shall be made that those materials shall be speedily consumed, and that the unconsumed portions shall be prevented from giving off offensive smells, as follows:

a. The blood of all slaughtered animals should be conducted by a water-tight gutter to a water-tight trough in the hog-yard.

b. The offal should be thrown into a pen with a tight dry floor, to be consumed at once by the swine; and all portions not consumed within twenty-four hours should be removed from the pen and should be burned, buried, or composted with fresh earth.

5th. When the blood or offal are not fed to swine on the premises, they should every day be carted off in close tanks, and in other places treated as described in Rule 4, or should be converted into fertilizers, or otherwise utilized by an apparatus, the gases arising from which should be carried under the furnaces and consumed.

6th. The heads, legs, and other bones may be treated as follows: They should be properly utilized within forty-eight hours, or shipped as often at least in the summer as once in two days.

7th. The fat, and all materials from which fat or oil is to be extracted, should be rendered within such time after the slaughtering of the animals that no offensive odors shall arise from them or from the process of rendering.

It is believed that slaughter-houses of every capacity, carried on in accordance with the foregoing rules and regulations, will be so free from offensive smells as not to be injurious to the health of any one.

If all slaughtering could be done at one place, much unnecessary expense could be saved,

1. As better apparatus could be secured at less cost for one than for two or more.
2. Sheds and stabling would be less expensive for one than for more.
3. Proper drainage could be procured for one at far less expense.
4. Abundance of water could be supplied more cheaply.

There are many other advantages that might be mentioned, but one of the greatest being a common ice-room or cooling-room where dressed meats could be allowed to hang for a season, until ready for use.

I append a draft of the butchers' refrigerator in use at Dallas Center, for which I am indebted to James L. Loring, Civil Engineer of our State Board. I heartily concur with him in the opinion that every butcher-shop in the land should possess a similar one.

All of which is respectfully submitted.

PHILIP W. LEWELLEN, M. D.,
Committee on Slaughter-Houses.

DALLAS CENTER, IOWA, November 16, 1880.

Dr. P. W. Lewellen:

DEAR SIR—I enclose you a draft of our butcher's refrigerator. I think it will explain itself. They have six acres, a mile from town, on which is their slaughter-house. The beef is raised by a windlass, all the blood goes into a large box-trough and runs through a smaller trough into the hog-yard trough. They keep a lot of hogs, and in a half-hour there is neither offal nor blood left. No meat is allowed to hang in the house, but the dray is right there and the meat is brought up and hung in the inner room of the refrigerator, marked "A" on the plat. There is a constant circulation of air, as the direction of the arrow will show you, and we never have a pound of tainted meat in this town. The thermometer hangs inside the glass window of the outer room, and in the hottest days at 98° outside the refrigerator is about 50° and below. If I had the power, I 'd legislate one of these refrigerators into every butcher-shop in the land. Hope it may satisfy you.

Yours truly,

JAMES L. LORING, *C. E.*

GLANDERS

IN

MAN AND DOMESTIC ANIMALS,

BY

L. F. ANDREWS,

SECRETARY OF THE

STATE BOARD OF HEALTH

FOR THE YEAR 1880.

GLANDERS IN MAN AND DOMESTIC ANIMALS.

The frequency of reports from various sections of the State of the presence of glanders among horses, leads to the conclusion that its prevalence is alarmingly wide-spread, as the result of a want of knowledge of the disease, and the primary symptoms by which it may be detected before infection has been had by a large number of animals. The author of this paper makes no pretension to veterinary knowledge, or claim for new facts to those already existing relative to glanders. His only purpose is to compile the most important and well-established facts, that the public may have a better understanding and appreciation of the nature of this, one of the most loathsome and dangerous diseases known. It only needs to be fully known to be avoided with horror.

HOW TO DETECT GLANDERS IN HORSES.

Dr. H. J. Detmers, V. S., of Chicago, in his report on the Investigation of Diseases of Domestic Animals, to the United States Department of Agriculture, gives the following definition of the different forms of glanders, which appears in a special report, No. 12, of that Department, 1879, page 257:

> Glanders is a contagious disease *sui generis* of animals belonging to the genus *equus*. It has usually a chronic course, can be communicated by means of its contagion to several other species of animals and to human beings, and must be considered incurable if fully developed. The principal seat of the morbid process is usually in the mucous membrane of the nasal cavities. Three main symptoms, viz., discharges from the nose, swelling of the submaxillary lymphatic glands, and particularly ulcers of a peculiar, chancrous character in the mucuous membrane of the nose, characterize glanders, and are, therefore, of the greatest diagnostic value. Wherever these three symptoms, or only two of them, are present and fully developed, there the diagnosis is secured. But unfortunately this is not always the case; sometimes two, and even all three, principal symptoms may be wanting, and still the horse may be affected with glanders. In such a case the seat of the morbid process is not in the nasal cavities, but further on in the respiratory passages, or even in the lungs. Several such cases have come to my observation, and have also been described by others, especially by Professor Gerlach. In still other cases, in which the disease might be called "external glanders," but is better known by the name of "*farcy*," the morbid process has its principal, or even its exclusive, seat

in the subcutaneous connective tissue and in the skin or cutis. The late Professor Gerlach, in his treatise on Glanders, published in the "*Jahresbericht der Konniglichen Thierarzneischule zu Hannover*, 1868, discriminates, in consequence of these differences, three distinct forms: Nasal or common glanders, pulmonal glanders, and farcy. As such a division of glanders proper into nasal pulmonal glanders—farcy is described by every author under a separate head—facilitates considerably the diagnosis, and explains also at once why just those symptoms which are usually looked upon as most characteristic remain sometimes imperfectly developed, or entirely unobserved, it will be convenient to adopt Gerlach's classification.

1. NASAL GLANDERS.—This form is that which is most common, best known, and characterized by the three principal symptoms which have been mentioned.

(*a.*) *The discharge from the nose*, although the most conspicuous of those three symptoms, is really the one which is the least characteristic, or of the least diagnostic value, because several other diseases of the respiratory organs are also attended with discharges from the nose, which are more or less similar. It is true, the discharge in glanders possesses some properties which, if considered as a total, are characteristic and are not found combined in any other disease; but the difficulty is, one or another of these qualities is not always sufficiently developed. Consequently, if the two other principal symptoms, the swelling of the lymphatic glands and the ulcers in the nose, are absent or not observed, the discharges from the nose are seldom characteristic enough to serve as the sole basis of a reliable diagnosis. The same are frequently one-sided, and, according to most authors, oftener from the left than from the right nostril. According to my experience, they are nearly, if not quite, as often from the right as from the left nasal cavity, and, at any rate, just as often from both nostrils as from one only, but always more abundant from one, either right or left, than from the other. At the beginning the discharges are usually thin, almost watery, frequently greenish, or somewhat similar in color to grass juice; afterward the same appear to be composed of two different fluids, one yellowish and watery and the other whitish and mucous. Still later the discharges become thicker, more sticky, exhibit frequently a mixture of different colors, are sometimes greenish, sometimes dirty white or grayish, contain not seldom streaks of blood, and, in advanced stages especially, particles of bone or cartilage. They have a great tendency to adhere to the borders of the nostrils and to dry there to dirty yellow-brownish crusts. As to quantity, the nasal discharges in glanders are seldom very copious, at least not as copious as in many other diseases—strangles, for instance. The quantity, however, varies. Sometimes, especially when the weather is warm and dry, the discharges may be very insignificant or be absent altogether, and, at other times, particularly if the weather is rough, wet, and cold, will increase in quantity and become comparatively abundant. Several authors have attached special importance to one or another of the various properties as something characteristic, by which the nasal discharges in glanders can be distinguished from those of other diseases, but, in reality, none of those properties are constant enough, or belong exclusively to glanders, to be alone of great diagnostic value. Solleysel and Kersting considered the stickiness as such a characteristic, but the discharges in strangles are frequently just as sticky. Pinter and Vilet relied upon the specific gravity; they found that the nasal discharges of glanders, which consist partly of matter and partly of mucus, sink to a certain extent in water, while the mucous discharges of distemper swim on the surface. This test is of some value, but is not decisive, because matter is sometimes admixed also to the nasal discharges of other diseases. Others have laid stress upon the one-sidedness of the discharge, but the latter is just as often from both nostrils as only from one, and a one-sided discharge belongs also to some other diseases; is, for instance, observed in a catarrhal inflammation of one of the frontal maxillary sinuses, if cavities in one of the three last molars of the upper jaw have effected a fistulous opening into the maxillary sinus, if a polypus has developed in one of the nasal cavities, etc. Professor Gerlach considers the greenish color as a very important characteristic, but that, too, is not reliable, because it is not constant, is usually observed only at the beginning, and belongs frequently, also, to the nasal discharges of catarrh, strangles, and influenza, if the patients are kept on green food or in a pasture. The nasal discharge constitutes a characteristic symptom of glanders only, if all its essential properties are present (sufficiently developed), and are considered as a whole. If the other principal symptoms (swelling of the lymphatic glands and ulcers in the nasal cavity) are absent or remain unobserved, some minor symptoms, which may happen to be present, and the absence of all such symptoms which are peculiar to other diseases, make frequently a diagnosis possible.

(*b.*) *A distinctly limited swelling of the submaxillary lymphactic glands* constitutes the second essential symptom, which is more characteristic of glanders, and of greater diagnostic value than the discharge from the nose. The swelling corresponds to the discharge; that is, the latter is one-sided, for instance, from the left nostril only, the glands of the corresponding left side of the head are affected, and if the discharge is from both nostrils the glands of both sides are swelled, but always those of that side the most on which the discharge is most copious. The swelling does not exhibit any conspicuous sign of inflammation, and is usually not painful, except at the beginning or after a sudden increase of the morbid process. It is always distinctly limited, and the swelled gland is always hard and usually of the shape and size of a peanut; may occasionally, however, be found as large as a hen's egg. Large inflammatory swellings without distinct limits do not belong to glanders. At first the swelled glands are more or less movable beneath the skin, but afterward, in an advanced stage of the disease, the same frequently appear to be attached more or less firmly to the bone and are immovable. The swelling, unless irritated by external causes, never dissolves in suppuration like the inflammatory swellings common in distemper, and is absent only if the lymphatic glands have been extirpated, if the lymphatics have become obliterated, or if the morbid process in the mucous membrane of the respiratory passages is situated too high to be within the province of those lymphatics which are connected with the submaxillary lymphatic glands, for the swelling is caused solely by a deposit of deleterious matter which has been absorbed by the lymphatics. Professor Gerlach looks upon every horse as probably affected with glanders which shows a distinctly limited, hard, knotty, and painless swelling of the submaxillary lymphatic glands. I will not contradict a man of his experience and learning, and admit that such a swelling constitutes a very suspicious and characteristic indication of glanders, especially if some other symptoms of the disease are also present; but I am obliged to remark that I have seen horses not affected with glanders in which those glands were swelled to the size of a peanut, and were hard, without pain, and movable.

(*c.*) *Ulcers of a peculiar, chancrous character* on the mucous membrane of the nose, and especially of the septum or cartilaginous partition between the nasa cavities, constitute by far the most characteristic symptom, and, in fact, the only one which makes the diagnosis a certainty, even if all other symptoms should be absent or imperfectly developed. Still, such is never the case; if there are ulcers in the nose, there is also a discharge of matter mixed with mucus from the corresponding nostril. In some cases the ulcers are present, but are situated too high to be seen unless the horse is examined in bright sunlight and the ray's of the sun are reflected by a mirror into the cavity of the nose. The seat of the ulcers is usually on the septum and near the nasal bone. Their size and shape vary. Some ulcers are small, isolated, almost round; others are large, of an irregular shape, and o uneven depth. All produce matter, have elevated, corroded borders, a dirty, steatomatous-looking bottom, and are never covered with a scab. At first small gray specks or elevated gray spots (glanders-nodules), varying in size from that of a pin's head to that of a pea, make their appearance. These nodules soon decay and form ulcers. Gradually the ulcers increase in size and depth; their borders become more elevated and corroded; the process of decay goes on; and if two or more small ulcers are close together, they become confluent, unite, and constitute one large, irregularly-shaped ulcer, which continues to increase in size and depth. Decay and destruction work their way deeper and deeper, even to the cartilage, and if ulcers happen to be existing in both cavities, or on both sides of the septum, it occurs not seldom that the latter becomes perforated. I observed several such cases, one especially in Lee Centre, Lee county, Illinois, in 1866, in which the hole in the lower or anterior part of the septum was fully as large as a silver half-dollar. The borders of the same appeared irregular, corroded, much swelled or elevated over the surface of the septum, and coated with a dirty-looking, discolored, and blood-streaked glanders-matter. The disease, in this case, was far advanced, and the animal about ready to die.

Sometimes it happens that a glanders-ulcer shows a tendency to heal; it loses its chancrous character; granulation makes its appearance; a scurf or scab is formed; a healing takes place, and a fibrous, whitish-colored, somewhat puckered or star-shaped scar is left behind.

Some authors have attached considerable diagnostic importance to a bluish or lead-gray color of the nasal mucous membrane, and to bluish or lead-gray spots, which usually make their appearance before it comes to ulceration. Such a bluish color, however, is not a constant symptom—in some cases only small red specks can be seen on an otherwise rather pale mucous membrane, and is not characteristic either, because it is observed also in catarrhal diseases, and in horses driven against the wind in cold weather.

(*d.*) *Minor symptoms.*—The three principal symptoms just described are usually accompanied by some others of minor diagnostic value, but under certain circumstances very important, especially if one or another of the principal symptoms should happen to be imperfectly developed. As such minor symptoms, may be mentioned, *First*, An accumulation of a glassy, whitish-gray mucus in the inner canthus or corner of the eye of the diseased side of the head. It is a symptom which usually makes its appearance at the beginning of the disease.

Second, A lusterless, dry, and dirty-looking, or so-called "dead" coat of hair.

Third, More or less difficulty in breathing.

Fourth, A peculiar short and dry cough, somewhat similar to the well-known cough of a horse affected with the heaves.

These last three symptoms, of which the cough is the most characteristic, make their appearance only after the morbid process has made considerable progress. In some cases the plain outbreak of the disease, or the appearance of the plain and unmistakable symptoms, is preceded by a swelling of the inguinal, the axillary, and other lymphatic glands.

The difficulty of breathing, and the peculiar and somewhat characteristic cough, though only minor symptoms in common or nasal glanders, rise to great diagnostic importance if the morbid process has its principal seat in the lungs, instead of the mucous membrane of the nasal cavities—if, in other words, the animal is affected with that form of the disease which Professor Gerlach has called "*pulmonal glanders*."

It happens sometimes that a horse is affected with glanders and communicates the disease to other healthy animals, but does not itself show any of the three principal symptoms characteristic of that disease; has no discharge from the nose, no swelled glands, or ulcers in the nasal cavities. The late Professor Spinola, in his lectures on veterinary pathology in Berlin, related such a case to his students, which will serve as an illustration. It is substantially as follows: In a village near Berlin glanders broke out in a stable in which several horses were kept. A veterinary surgeon was called, who made an investigation and condemned every horse that showed any symptoms of the disease, and every animal condemned was immediately killed. The horses apparently not affected were kept for several weeks under police control, and from time to time inspected, but finally released. Among them was an old sorrel horse which had the heaves, and which had been brought into the stable a short time before the first case of glanders made its appearance.

This old sorrel mare was sold several times, and in each stable where she was kept the horses were soon after her arrival condemned, though she escaped. Finally she came with other horses before Prof. Spinola who condemned her. The *post-mortem* examination revealed that the old sorrel mare which had the "heaves" was affected with pulmonal glanders in a very high degree, and had been the cause of the death of several valuable animals.

In pulmonal glanders the morbid process has its principal seat in the lungs, and may remain limited to the latter for months, and even for one or two years; and during that time, or as long as the morbid process is confined to the lungs, no prominent symptoms may make their appearance except such as are usual attendants upon heaves—some difficulty of breathing, and a peculiar short, weak, and dull cough, which must be heard, but is not easily described. Finally, however, but not before the disease has made considerable progress, the difficulty of breathing increases, more or less discharge from the nose makes its appearance, emaciation sets in, the natural glossiness of the coat of hair disappears and becomes rough, stands on end, and exhibits a so-called dead and dirty-looking appearance. The skin, too, loses some of its natural elasticity, and the animal becomes "hide-bound."

As the principal symptoms of pulmonal glanders are essentially, for some length of time at least, only such as are also observed in common cases of heaves (one of the most frequent disorders of horses), the diagnosis must frequently be based, as a lawyer would say, upon circumstantial evidence.

A horse must be suspected of being affected with glanders;

First. If the peculiar, weak, and dry cough constitutes, compared with the difficulty of breathing, the predominating symptom; if the animal becomes more and more emaciated and hide-bound, and if the appearance of the coat of hair is such as to indicate the presence of a cachectic disease.

Second. If it is known that the animal in question has been exposed to the contagion.

Third. If other horses have become affected with glanders or farcy, after having been together with the animal that shows those symptoms.

Fourth. If a horse apparently affected with heaves has previously exhibited other symptoms, more or less characteristic or suspicious, of glanders.

Fifth. If other symptoms, such as are observed in so-called "nasal gleet," or incipient nasal glanders, make their appearance.

Farcy, or external glanders.—The name "farcy" is given to such cases of glanders in which the morbid process has its seat in and immediately beneath the skin and in which nodules, boils (glanders buboes), and ulcers of a very infectious and chancrous character make their appearance in the subcutaneous tissue, and in the skin itself. Glanders-nodules and lenticular ulcers in the tissue of the skin, smaller and larger open ulcers penetrating the same, a strand-shaped swelling of the subcutaneous lymphatics, swelled lymphatic glands, and œdemata, the latter especially in the legs and on the head, constitute the most essential symptoms.

Professor Gerlach discriminates two forms; subcutaneous glanders or common farcy, and exanthematous glanders or skin farcy.

(*a.*) *Subcutaneous glanders or common farcy.*—The morbid process in this rather frequent disease has its principal seat in the subcutaneous connective tissue, and in the lymphatic system of the skin and between the skin and the muscles, but especially on the inner side of the hind legs, on the hips, on the neck, between the fore legs, and on all such places where the skin is thin and fine. At first distinctly limited swellings of an inflammatory character (incipient boils or glanders buboes) make their appearance in the subcutaneous tissue. These swellings or boils soon commence to dissolve, or to decay, from within; the ulceration begins in the center, but the matter, being very corrosive, soon works its way into the skin, the boil finally opens, and presents a farcy-ulcer with a steatomatous bottom, and elevated, corroded, and inflamed borders. At the same time, or even before the formation of the first ulcer has become completed, deleterious matter is absorbed by the nearest lymphatics, and deposited in the lymphatic glands. The former, in consequence, swell to hard and plainly visible cords or strands, and the latter to painful and distinctly limited tumors. The partial or total closing of the lymphatic vessels and glands thus effected interferes with, and even prevents, a performance of their functions, or stops the absorption of lymph, and œdematous swellings, more or less extensive, are the necessary consequence. The same make their appearance especially if the seat of the morbid process is on the inside of a leg, and if either the inguinal or axillary glands are swelled and closed by a deposit of deleterious matter. The more extensive and complete the swelling and closing of the lymphatic vessels and glands, or the more lymphatics are affected, the more extensive is also the œdema. Lameness, usually caused by such an œdema, is also a frequent attendant.

The roundish boils or tumors increase in size from that of a hazel-nut to that of a hen's egg. At first, when such a boil is making its appearance, it is not fastened to the skin; the latter can yet be moved a little in every direction over the boil, but soon the neoplastic process and the subsequent decay will extend to the tissue of the skin, and boil and skin will become firmly united before the ulcer breaks and discharges its extremely infectious and corrosive contents, consisting of decaying glanders-cells or matter, and lymph.

(*b.*) *Exanthematous glanders, or skin farcy.*—In this form of glanders or farcy the principal seat of the morbid process is in the tissue and in the lymphatics of the skin or cutis. It is a rare form in horses, but the only one in which external glanders or farcy makes its appearance in a human being. Distinctly limited swellings (nodules and tumors) of the size of a pea to that of a hazel-nut, either isolated, or united and resembling a string of beads, make their appearance in the tissue of the skin. These swellings soon break, and then present round ulclers with elevated and corroded borders. The discharge consists of a mixture of matter, composed mainly of decayed glanders-cells and lymph. In other, though rather rare cases, the swellings are very small and numerous, and present themselves as small nodules, some of which are so small as to be scarcely visible, while others are about as large as common peas. These small swellings, too, are soon changed to ulcers, which are usually flat, lenticular, and constantly suppurating. If close together the same becomes frequently confluent.

On the human skin, not being covered with hair, the whole process can be observed much better than on the skin of a horse.

NASAL GLEET.—This is a name which I have accepted only with great reluctance, because it signifies no definite disease, and is used frequently to cover ignorance, fraud, and crime. It can be retained only if applied exclusively to such cases of disease (usually occult or incipient glanders) in which the horse has a suspicious-looking discharge from the nose, but shows no other characteristic symptoms sufficiently developed to base upon them a sure diagnosis. So, for instance, it may happen that a horse has a chronic discharge of matter and mucus from one or both nostrils, and perhaps, also, a distinctly limited swelling of the submaxillary lymphatic glands, and yet neither the discharge nor the swelling may be sufficiently characteristic to justify the belief that the horse in question is affected with glanders, because the latter is a disease which, for obvious reasons, demands a correct and positive diagnosis. To declare that a horse has glanders is equal to condemning the same to be killed. The term "nasal gleet," therefore, is convenient and admissible, if used exclusively to signify a disorder of the respiratory organs attended with suspicious discharges from the nose, and other symptoms common in glanders, but not yet fully enough developed or sufficiently characteristic, one way or another, to make the existence or absence of glanders a certainty. Such a disorder, of course, must be considered as incipient or occult glanders till every doubt has been removed.

CHRONIC AND ACUTE GLANDERS.—Glanders, as a rule, is a chronic disease. The morbid changes develop slowly. Of the various forms in which the disease is able to make its appearance, pulmonal glanders, unless complicated with one of the other forms, or with other inflammatory or feverish diseases, is the most chronic, or takes the longest time to produce conspicuous symptoms and to become fatal. It takes frequently two or three years before the animal succumbs. Nasal glanders is usually not quite so slow in its progress; still it also very often takes half a year longer before the morbid process makes sufficient headway to produce plain, unmistakable symptoms, or before the chancrous ulcers, characteristic of glanders, make their appearance in the mucous membrane of the septum of the nose. Farcy, or external glanders, is usually the least chronic (comes the soonest to a termination) of the various (uncombined) forms of glanders. Plain and unmistakable symptoms (veritable farcy-ulcers) make their appearance almost always within three months and frequently within a week or two after the infection has taken place. In mules and asses, however, the various forms of glanders are usually less chronic, make a more rapid progress, are more destructive, and come sooner to a termination than in horses. The progress of the morbid process depends also to a great extent upon the constitution and the organization of the animal and the mode and manner in which it is kept. Weather and temperature, too, have considerable influence; warm and dry weather usually retards, and cold, wet, and stormy or inclement weather usually accelarates and spreads the morbid process. Most authors discriminate between acute and a chronic form of glanders. From a practical standpoint such a distinction is perfectly admissible, but to separate acute and chronic glanders as two different diseases, as has been done by some (French) authors, must lead, and has led, to very dangerous mistakes and to great confusion. Every form of glanders, as I have said before, is naturally—*ei ipso*—more or less chronic in its course, but may become acute, either from the first beginning or at any stage of its development, and sometimes very suddenly.

Wherever glanders presents itself as an acute disease, either an uncommonly large quantity of the contagion has been introduced at once and brought in direct contact with the blood, or a complication of some sort has been effected.

Dr. Ballinger, in an article on Glanders, uses the terms "chronic" and "acute" to distinguish the different developments of the disease. He says: "Although the chronic form often has an acute termination, the acute form is never transformed into the chronic. In acute glanders, whether in that form which if developed from the chronic, or in that which appears at the outset as such, there is to be seen, joined with marked febrile appearances, an excessive hyperæmic swelling of the mucous membrane of the nose, upon which, in the course of a few days, numerous tubercles, ulcers, and infiltrations may be made out. The nasal secretion is of a yellow tinge, viscid, and often sanguineous. The ulcers spread rapidly, even in the direction of the air-passages, and in the neighboring lymphatic glands and vessels, the changes peculiar to lymphangeitis (inflammation of the lymphatic vessels), and lymphadenitis (inflammation of lymphatic glands), may be found. There are frequently seen "cords" in the scalp, which in some places may be ædematous (swelling produced by the accumulation of serous fluid). As the fever and prostration increase, the nodules and ulcers often appear in other portions of the body, accompanied by ædamatous swelling of the extremities, the lower portion of the abdomen, and the breast. The animal grows thin, and after an illness varying in length from eight to twenty-one days, death ensues."

Dr. Charles H. Fisher, Secretary of the Rhode Island State Board of Health, in the annual report of that board for 1879, gives the following characteristic symptoms of glanders, in plain terms, comprehensible to the general reader:

ACUTE GLANDERS.

"The acute form is characterized by high fever, loss of appetite, thirst, shrinking of flesh, skin dry, hair standing out, pointing away from the body, the temperature of the mouth or rectum rising from 104° to 109° F. Trembling and shivering also are present, dependent in frequency and degree on the severity of the disease. The urine is usually very much increased in quantity, is clear and thin; the breathing, which runs up to forty, and even to sixty respirations per minute, is hard and labored; the pulse is quick and weak, while the heart can be felt and heard beating strong and loud. The lining membrane of the mouth has a saffron redness, and that of the nostrils is crowded with dark-colored blood, and sometimes thickened by swelling.

"After three or four days the fever begins to subside, and then there appear, in patches spread in scattered spots over the lining of the nostrils, little pimples, from the size of a pearl barley to a pea, having a bright red border, and a light-colored spot in the center. These pimples ulcerate, and within forty-eight hours leave a depression or pit, with ragged edges, about one-eighth of an inch deep, and with granulations like what is called "proud flesh" at the bottom. These pits grow wider gradually, or run together until they cover almost the entire surface of the nostrils in one continuous ulcerating sore, having preference to the partition of the nostrils, which may be, in rare instances, perforated through and through. A greenish hue of the diseased surface will indicate when mortification and perforation are taking place.

"At the time of the appearance of the pimples, there will also be a copious discharge from the nostrils, of a thin, yellowish, sticky fluid, not unlike that which occurs in catarrh from taking cold. This discharge gradually becomes thick, varying in color, sometimes streaked with blood, and having the characteristics of matter from an abscess. The quantity is increased, rather than diminished.

"At this time, also, the glands of the lower jaw become swollen and somewhat painful, especially from pressure. At first pliable and soft, they soon become hard, rigid and immovable. The inflammation of the nostrils extending to the throat and windpipe, occasions a dry, short, harsh cough, apparently painful, and often harassing.

"Pustules, or pimples, sometimes appear in the windpipe, and greatly increase the difficulty of breathing, and the cough.

"In some cases the joints swell, and become very sore and painful. 'Farcy buds,' so-called, which are small tumors, varying in size from that of a pea to a walnut, appear in or beneath the skin in various parts of the body, but more particularly where the skin is thinnest, as on the inside of the thighs and legs, beneath the abdomen and around the face. These ulcerate, sooner or later, and add to the distress of the animal, already overburdened with suffering.

"The lungs frequently become inflamed, deposits of glanderous matter resembling tubercles occur in them, which cause ulceration, increase the difficulty of breathing, and hasten the fatal result. Death occurs in from five to twenty days, according to the severity of the disease, and is usually preceded for a day or two by a return of the fever which ushered in the disease, and then temporarily subsides.

CHRONIC GLANDERS.

"The first notice of the presence of chronic glanders is usually a continuous discharge from one or both nostrils. There is a form of the disease, however, called "dry glanders," in which the discharge is very slight, and, therefore, unnoticable; but the cases are exceedingly infrequent. At the commencement, the discharge is thin and clear, but later the transparency entirely disappears, it becomes heavier and more tenacious, crusting within, and just outside the rim of the nose, and dripping slowly, or blown in thickened masses from the nostrils. The discharge is at first, small in quantity, but becomes more abundant as the disease progresses. The crusts that form around the nostrils, and upon the lips, have a soft, oily feeling when pressed by the finger. but notwithstanding the greasy feeling, will usually adhere to any substance with which they come in contact. These crusty accumulations have a dark brown, or mahogany color. After an indefinite period of time, depending on the severty of the disease, the discharges assume the appearance of pus, or matter from a running sore. If the disease is to take on a rapid progress the discharges appear like those in acute glanders, becoming thicker, bronzy in color, and sometimes streaked with blood. This is owing to more rapid extension of the ulceration in the cavities of the nostrils. When the disease progresses more slowly, the discharges are of a light green tint, and continue of that color, until more rapid ulceration, or the last stages of the malady occur.

"The discharges from the nostrils are not always offensive on account of an inherent fetid smell; the disagreeable odor noticed, in most cases arising from a retention of the matter, and its natural purefaction in contact with the air and the breath of the animal.

"At the commencement of the disease, if the forefinger be made to sweep around the internal surface of the nostril, there will be felt little protuberances, as though shot were imbedded in the lining membrane. Or, if the rim of the nose be turned over the thumb or finger, there will be seen little oval, or roundish elevations on the surface of the lining membrane, about the size of an ordinary pepper-corn, and of a deep straw color, while the lining membrane just around them is whitish and glistening as if polished. In the acute form of the disease, the membrane that borders the pustule is a bright red. These ulcerate in a few days, a small quantity of matter is discharged, and a pit is formed as in acute glanders. These pits are not usually more than half a dozen in number, do not spread by ulceration *so rapidly* as in the acute form of the disease, and instead of being of a bright red color; are nearer the color of rough slate, or sheet lead. The edges are also harder and form an elevated rim around the pit, and the surrounding tissues and base of the pit are hard and gristly.

"The ulcerating sores are frequently alluded to under the term of 'glander chancres,' having a resemblance, in their first stages to chancres of syphilis. They increase in diameter slowly but steadily, and when there are several in near proximity, they often run together, as in acute glanders, and form one large ulceration having, however, the same hardened outer border. In some rare instances, and under favorable circumstances the chancres heal, leaving white, circular scars in place of the pits. Such an occurence should not be regarded as evidence of the extirpation of the disease, but simply an effort of the system to repair its losses, assisted by rest, nourishing diet and the best of attention in every way. The healing of the chancres may go on also, while the disease is active elsewhere, as in the deposition or development of glanderous tubercles in the lungs. But the glander chancres will appear again in the nostrils, and continue on to destructive ulceration.

"After a variable length of time the glands between the jaws become enlarged. If the chancres are present upon, or within one side of the nostrils, the glands are usually swollen only on the same side. The enlargements vary from the size of a filbert to that of a middling sized peach. For a week or two after the glands become swollen they are tender upon pressure, and feel like putty enclosed in a thick, woolen, cloth. They then gradually acquire a firm, strong feeling, uneven over the surface, become bound to the parts around them, and frequently immovably fixed to the jaw-bone and skin. These glandular swellings never become running sores.

"Many horses are not suspected of having glanders until attention is called to their condition by some disability; as for instance, swelling of the joints, and fleshy parts of the legs with consequent lameness, general weakness, hurried breathing, nose-bleed, persistent cough, loss of flesh, etc. And cases occur oocasionally, in which none of the outward symptoms of glanders appear, the disease being located wholly in the internal organs, as the lungs, liver, spleen and glands of the bowels.

FARCY.

"This term simply distinguishes a form of glanders in which there is a local devélopment of the skin in the form of tumors in and beneath the skin. These appear more or less rapidly one after another, according to the severity of the general disease, and vary in size from that of a pea to that of a walnut (hickory nut). They ulcerate sooner or later, and become eating and spreading sores, with ragged borders, and surrounded by hardened ridges of flesh, with a marked depresssion in the center, from which large quantities of matter are discharged.

FARCY CORDS.

"After farcy buds appear there also may be seen long, straight, narrow ridges, as though a small rope lay beneath the skin. These, farcy cords, as they are called, always run from a farcy bud to the nearest lymphatic ducts, or pipes inflamed by the glanderous poison. They often become chains of farcy buds which develop in them, and which, in turn ulcerate and pursue the same course as the original farcy buds."

SPECIFIC CAUSE AND ORIGIN OF GLANDERS.

Dr. Detmers gives the following as the specific cause and origin of glanders:

The contagion must be considered as the exclusive cause of glanders. When I lived in Dixon, Lee county, Illinois, from the fall of 1865 to September, 1868, I had an opportunity of observing numerous cases of glanders. A friend of mine, D. W. McKinney, dealer in horses and proprietor of a livery stable, knew nearly every horse in the whole county, and taking special interest in those cases of glanders, assisted me in inquiring into the history of every horse affected. As a result, every case, without exception, was traced back to an infection by condemned United States army horses that had been sold to the farmers.

The contagious principle is developed during the very first stages of the disease, and even before plain symptoms have made their appearance.

Notwithstanding all those cases of apparent deuteropathic (secondary) development of glanders, which can be found in the veterinary literature of nearly every country, I am not afraid to say I do not believe that a case of real deuteropathic glanders, one that can stand a thorough and unbiased investigation, has ever occurred. Gerlach, in his treatise, says: "A genuine development, protopathic (first) and deuteropathic (secondary) must be considered as not proved."

Nobody has ever succeeded in producing glanders by merely exposing or subjecting a horse that has never been exposed to the influence of glanders-contagion to any or to all the injurious agencies and influences which have been mentioned as being accused as the cause of protopathic glanders. In the West, where I have lived and practiced during the last thirteen years, glanders, as I have been informed by reliable persons, used to be an almost unknown disease before the civil war, but has been spread by condemned army horses during and immediately after the war, and is now frequent and can be found everywhere.

The veterinary school of Lyons, France, has always kept aloof from the errors of the Alfort institution in regard to glanders, and has never denied the contagiousness of that disease.

The German veterinarians, though differing at times considerably in opinion as to the nature of glanders, have never doubted its contagiousness; and German governments have always been very strict in taking the most effective measures against the spreading of that terrible enemy of the equine race by requiring a prompt destruction of every horse reported by a veterinary surgeon as being affected with the disease. As a consequence, glanders has become a rare disease in Germany, and the annual losses are very insignificant.

Drs. John R. Page and J. J. Terrell, of Virginia, in their report on glanders which appeared among horses in the quartermaster's department of the Confederate army, say:

"The principle of contagion in glanders, whether strong or weak, is admitted by all ancient and modern observers."

"The contagion, once generated, multiplies itself without any assignable limit, as the smallest spark may spread the greatest conflagrations." The term is here used in its *specific sense*, meaning the direct transmission of disease by means of a specific virus, from one animal to another, by artificial or natural inoculation, as in the case of smallpox, syphilis, and hydrophobia, contradistinguished from the term *common contagion* or *infection* as applicable to measles, in man, and epizootic and distemper in animals. But we do not mean to deny the fact of its occasional propagation by common contagion or infection."

HOW IT IS COMMUNICATED AMONG HORSES.

Ziemssen's Cyclopædia, Vol. III, says:

> Thus far, observations have failed to determine the exact mode in which the virus of glanders penetrates the system. It is believed that virus having become attached to the mucous membrane or the unbraded skin, sets up at first at that point a local process, and thence forces its way subsequently into the remainder of the economy. It is a well authenticated fact that contagion is often produced by bringing in contact diseased and healthy animals, and, furthermore, by placing sound animals in stalls that have been previously occupied by those diseased.
>
> We are forced to admit the possibility of the *absorption* of the *virus together with the inspired air*, and in many instances, also with the food.
>
> We are justified in concluding that, in a large proportion, possibly a majority of all cases of glanders, *volatile infecting virus* has found its way into the economy, together with the inhaled air, producing either a primary blood-poisoning with secondary specific phenomena in the trachea, larynx, and upper portions of the nasal cavity, or primary nodules and ulcers in the lungs, followed subsequently by the symptoms of general poisoning. The mucous membrane of the nose may, indeed, be primarily infected when that part happens to be the seat of a wound or erosion.
>
> It has been determined that the virus of glanders in the form of a *fixed infectious material* may be found not only in the secretion from the nose, the solid and fluid contents of the nodules and ulcers, but also *in the blood*, and in the *secretions* and *excretions of the diseased body*, as the tears, saliva, sweat, urine and milk.

Gerlach says:

> *The communication of the morbid poison by means of external media*, especially the harness, has been frequently observed. Some cases are also known in which the disease was communicated by the act of *coitus*, by *suckling*, by *hereditary transmission*, and finally by the *absorption of the poison together with the food.*

The Boston *Ploughman* of March 2, 1878, says:

> Horses occupying a different stable from that of the affected animal have been known to contract and die of the disease; and this, too, in face of the fact that they were never brought in contact with each other. And yet, with a full knowledge of the risk they run, some men are foolhardy enough to keep a glandered horse on their premises, prompted by the vain hope of being able to cure the patient of the disease.

Dr. Youatt, in his treatise on the horse, says:

> One horse has passed another when he was in the act of snorting, and has become glandered. Some fillies have received the infection from the matter blown by the wind across a lane, when a glandered horse in the opposite field has claimed acquaintance by snorting. It is almost impossible for an infected horse to remain long in a stable with others without irreparable mischief.

That animals showing but slight symptoms of the disease may communicate it, is abundantly proven by Dr. Detmers, who cites many cases within his own practice and observation. He also gives the following marked example, as related by Professor Spinola, in a lecture on veterinary pathology at Berlin:

> In a village near Berlin glanders broke out in a stable in which several horses were kept. A veterinary surgeon was called, who made an investigation, and condemned every horse that showed any symptoms of the disease, and every animal condemned was immediately killed. The horses apparently not affected were kept several weeks under police control, and from time to time inspected, but finally released. Among them was one old sorrel horse which had the heaves, and which had been brought into the stable but a short time before the first case of glanders made its appearance. This sorrel horse soon after was sold to a man in another village, and came into a stable containing also quite a number of horses. In that stable, too, glanders broke out. A veterinary surgeon (another one) was called, and every horse showing symptoms of glanders was condemned and immediately destroyed. The old sorrel horse, however, which was known to have "the heaves," was again released after some length of time, together with those which had remained exempted, and was sold once more, this time to a man who kept over thirty horses (I have forgotten the exact number) in his stable a few miles from the city. In this last stable glanders likewise made its appearance after some lapse of time, but in that case Professsor Spinola was called. He, too, after a careful investiga-

tion, condemned every horse that showed any symptom of glanders, and insisted upon condemning also the old sorrel horse, whose history was then unknown to him, notwithstanding that no symptoms of disease, except such as are usual attendants of heaves, could be observed. The owner hesitated to consent to the loss of a horse apparently not affected with glanders, but Spinola insisted upon the condemnation. The *post-mortem* examination revealed that the old horse, which had the "heaves," was affected with pulmonal glanders in a very high degree; and Spinola, after learning the history of the old sorrel, was convinced that the latter had caused the outbreak of the disease in all three stables.

Professor M. Stalker, of the Iowa State Agricultural College, Professor of Veterinary Science, says:

It is a fact not known to every stock-raiser, that an animal may have the glanders for years, and continue to work with little or no inconvenience, and show no very alarming symptoms to one not accustomed to seeing the disease. Yet such is the case, and this renders the disease all the more dangerous, as under such circumstances the symptoms are likely to be attributed to catarrh or some other comparatively trivial ailment. In this form of the disease the contagion is much less active than in the acute form, another circumstance which tends to put at rest the suspicion that may arise in the mind of the owner.

Drs. Page and Terrell, in their report already referred to, say:

Horses recognize and communicate with each other by the sense of smell. It is in this way, perhaps, that the mucous membrane of the nose becomes the first apparent seat of glanders. The glandered horse blows the virus from his nose on everything around him, and the disposition of these animals to recognize animal matter, wherever found, induces the sound horse to investigate the character of the attracting and noxious secretion. He does this by a strong inhalation; the noxious matter is in this way drawn up and retained upon the delicate mucous membrane of the nose, or is perhaps caught by the roughened surface of an abrasion; it finds its proper "nidus" (nest) and multiplies its morbific influence. It is possible a horse may have glanders for several weeks, and even for months, before it becomes an active agent of contagion, from the fact that the disease is often very slow, and insidious on the onset, and it is only when the mucous membrane of the nose becomes covered and irritated by chancrous (cup-shaped) ulcers that the snorting out of the virulent matter exists, every surrounding object then becoming a deposit for the virus.

TREATMENT OF GLANDERS.

Of the probability of a cure of the disease, Dr. Youatt says:

In a well-settled case of glanders it is not worth while, except by way of experiment at a veterinary school, to attempt any remedies. The chances of cure are too remote, and the danger of infection too great. Worse than all, the man who attends the horse is in danger.

Dr. Detmers give the following as the only safe and rational treatment of a glandered horse:

> The only rational treatment of a horse or other animal affected with glanders consists in a proper and effective application, in the right place, of either half an ounce of lead or five inches of steel; and until such treatment is invariably adopted, or made compulsory, there will be no prospect whatever of freeing this country from this loathsome disease, dangerous even to man, in whom, if once infected, it is just as incurable as in horses. * * * *Confirmed glanders must be considered as incurable.*
>
> As a general rule, which, however, suffers apparent exceptions, glanders is frequent in all those countries in which a great many horses are imported, and rare in all those countries in which more horses are raised than needed, or from which horses are exported. * * * That glanders is most frequent in those countries in which numerous horses are imported from other countries. This is an undeniable fact except in regard to those commonwealths in which good veterinary schools provide a sufficient number of thoroughly educated veterinary surgeons, and in which stringent laws enforce the immediate destruction of every animal affected with glanders, prohibit veterinary quackery, and do not allow anybody to keep or to treat a glandered animal unless he is a qualified veterinary surgeon, and gives sufficient bonds to pay-possible damages.

PREVENTION OF THE DISEASE.

It is the decision of all writers upon glanders, that complete extermination is the only sure prevention against the disease. Dr. Detmers says:

> As to a medical treatment, there is scarcely a remedy known in the whole materia medica that has not been used against glanders, but, so far at least, with very poor success. It is true a great many *pretended* cures are on record. But if the slow or chronic progress of the morbid process, its frequent remissions in warm and dry weather, exacerbations in rough, cold, and inclement weather and in a foul atmosphere, and the great confusion that has prevailed in regard to the true nature of glanders are taken into consideration, it is no wonder that mistakes and deceptions have occurred. Some of the cases that are said to have been cured have been no glanders at all, and in others the pretended cures have been only temporary—a mere remission. *Confirmed glanders must be considered as incurable;* and it would, therefore, be for the benefit of every one if our general government (Congress) enact a law which should make it a criminal offense to keep and to use a horse, or any other animal, known to be affected with glanders. Any attempt to cure should be strictly forbidden, because a prompt and immediate destruction of every animal affected with glanders, a disease which spreads only by means of its contagion, constitutes the best, surest, and cheapest, and in fact the only prevention.
>
> A successful prevention of glanders is possible only if the contagion—which,

even if it should not constitute the sole and only cause of the disease, causes at least nine hundred and ninety-nine cases of one thousand—is thoroughly destroyed wherever it may exist or wherever it may be found Consequently every animal affected with glanders should be killed as soon as the nature of the disease becomes known, and be buried sufficiently deep or be cremated. But as the contagion adheres frequently also to the stables—manger, floor, partition, etc.—that have been occupied, the stable utensils—brush, curry-comb, etc., and the harness, blankets, halters, bridles, saddles, etc.—that have been used or been in contact with glandered horses, it is of great importance to know what will best and most effectually destroy the contagion. Professor Gerlach has made very interesting and valuable experiments, to relate which, however, would lead too far. I will therefore only state the results arrived at. The discharges from the nose, glanders-matter, etc., lose their infectiousness if perfectly dried by being exposed to currents of air or to the rays of sun; but kept moist, for instance in a damp cellar, wrapped up in a moist rag, or adhering to the corners of the manger, to a damp wall or floor, or to the bedding or the manure, etc., the contagion seems to possess great vitality, and may remain effective for half a year or longer. Putrefaction does not destroy the contagious principle. Chlorine destroys the contagion, and is therefore a very efficient disinfectant, provided the chlorides used come in actual contact with the contagion. A brief exposure of the infectious substances, nasal discharges, glanders-matter, etc., to the influence of chlorine in a gaseous state, mixed with the atmosphere, is ineffective. As a remedy to be given internally, chlorine, in shape of chlorine-water, for obvious reasons cannot be used; chemical combinations will be effected before an absorption can take place. The best and surest destroyer of the glanders-contagion is carbolic caid. It may be used not only as a disinfectant or for the purpose of destroying the contagion clinging to the wood-work of the stables etc., but also in incipient cases of farcy, and in cases in which an infection with glanders-matter has just taken place in a wound, for instance, as a local remedy. If applied to the glanders-ulcers on the septum, or to farcy-ulcers, a tendency to heal will make its appearance. As a disinfectant, a solution of carbolic acid in glycerine or alcohol and water (1:1 or 2:20) is perfectly strong enough to be effective. Old straw, hay, and bedding must be burned, and blankets, etc., are best disinfected by exposing the same for some time to a temperature of 212° F, or higher, either in an oven or in boiling hot water.

Glanders, as well as pleuro-pneumonia, Russian cattle-plague, and scab and manger, will cease to exist if a propagation by means of infection is made impossible. If, for instance, within the limits of the United States all animals affected with glanders were destroyed at once, and at the same time every place where glanders-contagion may be existing were thoroughly disinfected, and if any importation of glandered horses or of the contagion were successfully prohibited or prevented, glanders would at once become extinct, and would never make its appearance again within the limits of the United States, unless imported again from other countries. It is a disease that can be eradicated.

The necessity for a stringent law, making the keeping and sale of a glandered horse or any other animal affected with a contagious disease, and also the rapidity with which glanders will spread is shown by an instance cited by Dr. Detmers:

> Mr. George T——, Pottawatomie county, Kansas, bought a horse of a Mr. Ch——, Manhattan, Riley county, Kansas, and pastured and stabled the same with his other horses, about twenty-four or twenty-five in number. The horse in question, when bought, had some discharge from the nose, which, of course, was pronounced to be nothing but the product of catarrh—in common parlance, a cold. In the course of the winter several of Mr. T——'s horses commenced to have discharges from the nose. Mr. T—— became alarmed, and brought the new horse, whose nasal discharges had increased, and who showed other symptoms of disease, such as a staring coat, emaciation, etc., to me for examination. I found the symptoms to be those of an advanced stage of glanders. Subsequent inquiries revealed some of the previous history of the animal. Mr. Ch—— had bought the horse from another man, whose name I do not remember, only a few days before he sold the same to Mr. T——, and had kept the animal, while in his possession, strictly separated from his other horses, because he knew the same had a chronic discharge from the nose, and had had it for about two years. Is not such a transaction criminal? And still, in the case mentioned, there is no redress to be had. Mr. T—— is a comparatively poor man; his farm is mortgaged, and all the property he may call his own consists in his stock, but especially in his horses.
>
> It is possible that he has lost, or will lose, nearly every animal he has. Mr. Ch—— does not own anything; all his property is in his wife's name; consequently Mr. T——, if he sues for damages, will have to pay lawyers' fees and costs, but cannot recover anything. If there were a United States law which made it a criminal offense to sell animals affected with contagious diseases, or to own and to keep animals which exhibit symptoms of contagious diseases, and to neglect to advise the proper authorities of the fact, such cases as the one related would not occur. If Mr. T—— was not an honest man, he would undoubtedly have kept still, and would have sold his glandered horses to other innocent parties, and contributed in that way in spreading the disease.

In Jasper county in this State a similar case was reported to the State Board of Health.

W. H. Penquite, who rented a farm near Greencastle, was the owner of several horses. They were attacked with a disease which had all the symptoms of glanders. They all died but one. It was traced to a horse, owned by an irresponsible man, which had for several years been affected by what he claimed was only nasal catarrh, though it was well known that horses which had come in contact with this animal were taken sick and died. On the 8th of April Mr. Penquite wrote this office, to-wit:

GREENCASTLE, IOWA, April 14, 1881.

L. F. Andrews, Secretary State Board of Health:

DEAR SIR—I have one horse that I think has the pulmonal glanders. There are no veterinary surgeons in this part of the country, and as I have lost all my horses but one, and being a poor man, and a renter, I am not able to send off for a surgeon to examine. I wish we could get a first-class surgeon to make an examination for the benefit of the public, and I think the State Board could send one to make the examination. We have some quacks here that a man can hire to say that his horse is all right. Such is the case in regard to the horse that gave mine the disease.

W. H. PENQUITE.

The foregoing was referred to Governor Gear, who requested Dr. C. N. Wright, a veterinary surgeon of Des Moines, to go and investigate the case, which he did, and found the disease to be glanders. He condemned the horse, and ordered it killed, but it died a few hours after.

GLANDERS IN MAN.

Aside from the property consideration of glanders in horses, is the horrible fact of its communication to man. Medical records abound in instances of the disease in man.

Dr. Samuel P. Duffield, Professor of Medical Jurisprudence in Detroit (Mich.) Medical College, reports in full in the Detroit *Lancet*, December, 1879, a case of a young man who came under his care, in April of that year, and who died on the 15th day. He had been driving to the plow a glandered horse, handling the animal more or less, and taken the infection through an abrasion of the skin between the thumb and first finger, caused by holding the plow. Dr. Duffield concludes the report by saying:

> I know of no more horrible death to a human being. The face, under the ravages of the disease, becomes sadly changed. The forehead and nose are red and swollen; both eyes are closed with tumefaction and ulceration, eschars (scabs) surrounded by a livid œdematous border—all contributing to the awful mutilation of the features; coupled with this comes the terrible odor of the breath, and the involuntary discharge, to complete the picture of this incurable disease.

Dr. A. Post, of Birmingham, Oakland county, Michigan, reports the case of Squire Trumbull, and which will be found in the annual report of the Michigan State Board of Health for 1879, page 306.

He was seventy-three years of age, weighed two hundred pounds, strong, vigorous, and of sanguine temperament. He owned a glandered horse, which he handled, and had been treating the animal by syringing out his nose. He had "knocked the skin off" his hand, and thus became inoculated. He died on the 14th day, a most pitiable looking object, and was buried immediately without being dressed or laid out, being lifted into the coffin upon the sheets and bedding upon which he lay.

The State Board of Health of Connecticut in their Annual Report for 1879, give the details of a fatal case of glanders in man at Waterbury in that year.

C. R. Merrill, a blacksmith, now residing in Des Moines, related to me a case which occurred in Warren county a few years ago. A young man, strong, athletic, and in perfect health, brought to his shop at Indianola, a pair of horses to have shoes put on them. They were fat and sleek as good feeding and fine grooming could make them. Mr. Merrill noticed that they were discharging from the nose, and called the attention of the young man, John Fisher, to the fact, expressing at the same time, his fear that the horses had the glanders, and hesitated about handling them. Mr. Fisher replied with considerable emphasis that the horses were all right, that they had taken cold, and the same instant stepped up to one horse and wiped away the discharge from the nostril with his thumb, on which there was an abrasion of the skin. He was immediately taken ill, and died a most horrible death in twelve days from glanders. The horses were then shot. Both physicians who attended him have since deceased, so that a history of the case cannot be procured.

Glanders in man is, with rare exceptions, fatal.

Prof. Bollinger says:

> We are able to pronounce the prognosis in acute glanders (in man) as unconditionally unfavorable, the result being almost invariably fatal.

HOW GLANDERS MAY BE COMMUNICATED TO MAN.

In view of the nature of the disease, and that the danger of infection may be avoided, it is important to know the sources of danger. Cases are cited where infection was had through a wound made by a whip, which had been used on a glandered horse; by a bruise received on a finger from hitting a door-post of a stall where a glandered horse was kept; by drinking from a pail from which a glandered horse had drank; by using a handkerchief with which the face of a glandered horse had been wiped; by slight scratches on the skin; by hang-nails, etc. The virus may enter the system through the nose, eyes, or mouth. by particles of pus snorted from the nose of a glandered horse, hence the great danger incurred from riding behind such an animal. The disease has also been contracted by sleeping on straw in a stall where a glandered horse had been kept; also, by using a blanket which had covered a glandered horse; also, from handling hides taken from glandered horses, hence the great importance of placing the carcass of such animals beyond the possibility of infection. In France the skin of a glandered horse at death is slashed so as to render it worthless for manufacturing purposes. It should be buried deep, beyond the possibility of resurrection; for the disease is communicable to other animals, than which none are more liable to infection from carcasses of glandered animals than dogs, which fact increases the danger, owing to their association with man and domestic animals.

Ziemssen's *Cyclopædia* says:

> Glanders occurs in asses and mules, as well as in horses. Sheep are especially susceptible to glanders. Goats, dogs, cats, prairie dogs, polar bears, lions, rabbits, guinea pigs, mice and swine have been known to be infected with the disease. The only domestic animal that seems to be exempt is the ox.

Dr. Detmers, in his report, page 285, says:

> The glanders-contagion, whatever its nature may be, communicates glanders and farcy not only to the animals belonging to the genus equus, but also to other animals and to man. Numerous cases are reported every year in the periodical veterinary literature. The only domestic animal that seems to be exempted, or to be destitute of any predisposition, is the ox.

NECESSITY AND MEANS OF PREVENTION.

It is evident the only means of preventing glanders in man, is the extirpation of glandered animals. It is exceedingly important that the disease should be grappled at the first appearance, and the suspected animals securely guarded against all possible infection, and that when the nature of the disease is determined, the animals be immediately killed and buried.

Dr. Detmers says:

> Glanders, as well as pleuro-pneumonia, Russian cattle plague, and scab and mange, will cease to exist if a propagation by means of infection is made impossible. If, for instance, within the limits of the United States all animals affected with glanders were destroyed at once, and at the same time every place where glanders-contagion may be existing were thoroughly disinfected, and if any impor-

tation of glandered horses or of the contagion were successfully prohibited or prevented, glanders would at once become extinct, and would never make its appearance again within the limits of the United States, unless imported again from other countries. It is a disease that can be eradicated.

It is quite clear some measures should be adopted for the control and management of horses suspected of glanders. To this end the following general rules are formulated and recommended by the Michigan State Board of Health:

1. Whenever there is reason to suspect that a horse or other animal has the glanders, or has been exposed to the disease, he should be entirely separated from all other animals susceptible to the disease, until from an examination, or from repeated examinations by a competent veterinary surgeon, it can be positively determined whether or not the animal has the disease, or, in case of a possible exposure, whether he has, without contracting the disease, passed the maximum period of incubation.
2. Notice of a case, or of a suspected case of glanders, should at once be given to the health physician, or board of health of the city, town or township in which the animal may be owned or kept, and all persons who might have anything to do with the suspected animal should be warned of the danger which they incur. As few persons as possible should go near such animal, and they should be instructed and enjoined to take all possible precautions against contracting the disease, or conveying it to others; they should avoid his breath; keep to the windward side; avoid receiving on an apbraided skin any discharges, etc.
3. No glandered animal, or one suspected of glanders, should be taken into any field, common, road, building, or other place frequented, or liable to be frequented by horses or other animals susceptible to the disease.
4. When an animal is known to have the disease, he should be killed immediately, and the carcass buried deep in the earth, with the hide on, the hide having previously been slashed.
3. The feed-boxes, mangers, racks, where he has been fed, or anything which he may have bitten or rubbed against; any post or fence against which he may have rubbed; the harness, halter, wagon-pole, neck-yoke, combs, brushes, and all else which has been used on or about him, should be burned and destroyed, as the only safe and effectual mode of preventing contagion.
6. The stable in which a glandered animal has been kept should be destroyed, or, if practicable, thoroughly disinfected by burning therein not less than two and one-half hounds of brimstone to every thousand cubic feet of air space therein. To properly disinfect a stable it must be closed tight.
7. As some persons and animals are more susceptible to glanders than others, the greatest precaution should be observed to keep all from exposure, for in no case of exposure is there certainty of escape from the disease.

NECESSITY FOR LEGISLATION.

The statutes of Iowa are inadequate to secure the necessary protection against this disease which its nature demands. Section 4057 of the Code of 1873 provides that if any person finds a glandered horse, mule or ass reasonably supposed to be diseased with glanders running at large on his premises without any known owner, it shall be lawful for him to take such animal before a justice of the peace, for examination by a competent veterinary surgeon. That is to say, he must chase the animal over his farm, exposing other animals to infection, catch him and lead him miles away to a magistrate, exposing his own life, while the diseased animal scatters infection broadcast on the way. Ample authority should be given local boards of health to restrain all suspected animals until the disease could be determined. They should also have power to cause immediate investigation on notice, of any suspected case of glandered horse, and to order any animal diseased with glanders to be killed and buried.

Under the powers given in section 2, chapter 151, laws of the Eighteenth General Assembly, the State Board of Health has adopted the following rules for the use of local boards of health: [see page 22]

> No animal affected with an infectious or contagious disease shall be bought, sold, or kept within the jurisdiction of this board. And any animal affected with glanders shall, after notice from this board, be immediately killed, and buried deep, without removing the hide from the carcass.
>
> The owner or any person having the care of any animal within the limits of this [city, town or township] knowing or having reason to believe said animal to have the disease called glanders, or farcy, shall not lead, drive or permit such animal to go in or over any public grounds, uninclosed lands, street, road, public highway, lane, or alley in this [city, town or township], or water such animal or permit it to drink at any public water-trough, pail or spring; or suffer such diseased animal to be kept in any enclosure in or from which may come in contact with or close proximity to any other animal not affected with such disease; and such persons aforesaid shall, within twenty-four hours, give notice to the health officer or the board of health of this [city, town or township] of the location of the diseased animal. And any veterinary surgeon, or any person who acts as such, who shall have knowledge of any animal diseased with glanders or farcy within the jurisdiction of this Board shall within twenty-four hours give notice of the same to the health officer or board of health of this [city, town or township].

While the powers of the State Board of Health may be construed as ample to secure protection, it is better to have the question settled and fixed by direct statute, with penalties affixed sufficient to insure compliance therewith, and commensurate with the horrible nature of the disease.

GLANDERS IN IOWA.

As has been stated, the frequency of cases of glanders reported to me evidences its prevalence widely over the State. Cases have been reported from the counties of Adams, Cass, Crawford, Dallas, Fayette, Grundy, Guthrie, Jasper, Marion, Madison, Polk, Poweshiek, Union, Warren and Webster.

Having no authority in the premises the matter was referred to Governor Gear, who selected Dr. C. N. Wright, of Des Moines, Professor M. Stalker, of the State Agricultural College, and Drs. James Dolson & Son, of Atlantic, competent veterinary surgeons, to make examination of suspected horses in their vicinity. Professor Stalker reports finding in Lincoln township, Grundy county, five cases of chronic glanders and other cases in which the symptoms were, but not sufficiently developed to positively determine the disease.

Dr. Wright reports one horse found on the commons in Des Moines; one mare in Delaware township, Polk county, in the last stages of pulmonal glanders; also, one colt, diseased with nasal and external glanders; in Poweshiek township, three cases of nasal and external glanders; in Washington township, Monroe county, two cases of nasal and external glanders; in Boonville, Dallas county, two cases of nasal and external glanders; in Madison township, Madison county, two cases—one nasal, the other nasal and external glanders; in Stuart, Guthrie county, two cases—one nasal, the other nasal and external glanders, in all of which the animals were condemned.

Drs. Dolson report as follows:

ATLANTIC, IOWA, August 13, 1881.

Secretary of the State Board of Health:

DEAR SIR—I herewith give a statement of the animals I have examined and condemned as having glanders: One horse, two and one-half miles from Atlantic; killed. The owner's name I have forgotten.

On the premises of Mr. Huntoon, four miles southwest of Atlantic, three mules, all killed at once.

I was called by the board of health of Union township, Adams county, to investigate suspected cases of glanders, and found one horse owned by Thomas Edwards; two by August Rettz; one by M. Looney; one by M. Talley, all of which I condemned. While at Cromwell, in Adams county, a case was reported to us where a man who resided just across the State line in Missouri traded for a horse which the seller said had epizoo. In nine days after the purchaser died from acute glanders.

On the farm of John P. Irish, eleven miles southwest of Atlantic, I found two horses diseased with glanders.

There is no doubt glanders exists to a fearful extent in nearly every county and township in Iowa, and unless prompt and effective measures are taken to eradicate it the result will be horrible. The law now seems to be very defective to secure this result. It should be made a criminal offense, with severe penalty, for any person to keep in his possession or on his premises a glandered animal, and in case of suspected glanders the owner of the animal should be compelled to isolate and confine such animal entirely apart from all possible contact with other animals, until the disease is fully determined. Only severe measures will accomplish the desired end, as it is the natural inclination of persons owning such an animal to secrete the disease.

Respectfully,
JAMES DOLSON & SON, *Veterinary Surgeons.*

A large number of cases have been reported to Governor Gear, and requesting him to send a competent veterinary surgeon to investigate the disease and determine whether or not it be glanders, it being proverbially the case that owners of suspected glandered animals deny that the disease is glanders, from pecuniary motives, and the result is, under the present statutes, the animal goes at large, scattering the disease wherever he goes. The necessary legislation should be had to authorize local boards of health, or health officers thereof to isolate all animals suspected of glanders, and also compel the owners of such animals to keep them separate and apart from all possible infection or contact with other animals, and prohibit them from going upon public highways, or the premises of another, until the nature of the disease is definitely determined by competent authority.

The cases reported to the Governor were: Cedar Rapids, 3, September 1; Anita, Cass county, several, July 22; Webster county, 20, July 8; Polk City, Polk county 1, July 16; Melrose, Grundy county, 4, July 8; Calhoun county, 8, July 8; Warren county, 2 mules, July 10; Rippey, Greene county, several horses and mules, July 27; Dexter, Dallas county, 1, September 20; Adair county 2; Madison county, 40, August 5. The latter is doubtless an exaggeration.

In all cases reported relief is asked under the health law, but it is only by presumption, or implication that this law affords any remedy. The State Board of Health have exercised in that direction all the power given the Board, under the statute, which is only directory. It should be made mandatory by legal enactment.

ADULTERATION OF FOOD.

BY

R. J. FARQUHARSON, M. D.,

BY SPECIAL REQUEST OF THE

STATE BOARD OF HEALTH.

Four Hundred and Fifteen East 14th St.,
Davenport, Iowa, April 30, 1881.

Dr. W. S. Robertson, *President Iowa State Board of Health, Des Moines, Iowa.*

Dear Sir—Herewith, I have the honor to transmit my report on the "adulteration of food." Hoping that it may prove acceptable to the Board, I am, very respectably your obedient servant,

R. J. Farquharson.

ADULTERATION OF FOOD.

The subject assigned to me by the State Board of Health is of too great importance and of too vast an extent to be properly treated in a paper, the length of which is necessarily limited by a total want of original facts, the results of investigations requiring both time and money for successful prosecution.

In this country, up to within a few years past, there have been few, if any thorough and reliable examinations into the purity of the most important of foods, the staple ones.

The truth of this statement is made quite apparent from the following fact:

The National Board of Trade, last year, offered prizes for essays on the adulteration of food in this country. "The object (among others) to be kept in view in preparing the essay shall be to show (first) what are the usual deleterious adulterations of articles of food or drink in this country."

Now, of three essays deemed worthy of a prize, and published in a supplement to the Sanitary Engineer (January, 1881,) neither contains any account of any research into the condition of food in this country, but all quote Hassall (London, 1854, 1st. ed. 1876), that apparently inexhaustable mine for subsequent writers in all countries.

The author of the essay getting the second prize (Vernon M. Davis of New York City), in the fifth paragraph of his valuable paper, says: "*Dr. Hassal's examination of the subject has shown that adulteration was universally practiced in England.*" "*It is not unlikely that most of the same adulterations will be found in the food and drink of the United States.*" "*In the third place, annalyses, so far as they have been made in this country, prove the existence of the practice, and reveal adulterations identical with those discovered in other countries.*"

Now, according to Hassall, there has been a great change for the better in England, for, in 1860, he, as chief of the Lancet Commission reported sixty-five per cent of the total samples examined as adulterated; while in 1879, of 17,500 samples examined, 17.2 per cent were found adulterated; of bread in 1860, almost all samples contained alum, while in 1879, of 4,471 samples of bread examined, only 4.62 per cent were found to contain any adulterations.

That the inference of the existence of any such general adulteration of food in this country, comparable to what formerly existed in England was not sustained by a perusal of these papers, nor by any investigations that have been made thus far is shown by the following remarks by the eminent men composing the committee of award.

"*It is very gratifying to find that none of the essayists produce any definite or satisfactory evidence as to the wide-spread existence of such dangerous adulterations in this country.*" "*The absence of such evidence, in addition to the results recently attained by several expert chemists in extensive series of analyses of the usual articles of food in this country, which results have been made known to the committee, fully warrants us in declaring that none of our staple articles of food or drink are so adulterated as to be dangerous to health or life. Such dangerous adulterations appear to be mainly in the form of poisonous colors or coloring matters, as for instance, in confectionery, and even these are rare.*"

The investigations alluded to by the committee of award are those of Dr. Kedzie, President of the Michigan Board of Health, and of Dr Smart, U. S. A., published in recent supplements of the Bulletin of the National Board of Health; and of Mrs. Ellen H. Nickols, in an article on "*The adulteration of some staple groceries*," published in the First Annual Report of the State Board of Health, Lunacy and Charity of Massachusetts (1879).

These several papers have been freely used in the preparation of this article; where other authors are used, an acknowledgement will be found in a foot-note or otherwise.

The author of this paper will feel most abundantly repaid for any time and labor bestowed upon its production, if the perusal of it by the people of Iowa should have little other effect than to quiet their minds of apprehension and disabuse them of the effect of certain sensational articles going the rounds of the daily press, apparently neither by persons of a pessimist cast of mind, who would exclaim with Falstaff, when he found lime in his sack, "There is nothing but roguery in villainous man."

The fact being, as shown by the most recent and most carefully conducted researches, that all of the staple articles of food which are commonly found on our tables in America, when of fair quality, *i. e.*, when bought at a fair price, are nearly or quite pure; and if not absolutely free from foreign ingredients, the apparent sophistication is accidental or incidental, and not intentional.

We shall now review, in as concise a manner as is consistent with requisite clearness, most of the articles of food used in this country; dwelling longer upon and treating more in the detail of those either produced largely, or commonly consumed in the State of Iowa.

FLOUR.

This "staff of life" appears in England to be liable to adulteration by the following articles: The meals of barley, beans, potatoes, maize, oats, rye and rice; with carbonate of lime or magnesia; sulphate of lime and bone dust. But in this country where it is abundant and cheap, such is not the case; the most samples, if not quite pure, at least are seldom or never intentionally adulterated.

In Massachusetts, twenty-five (25) samples of flour, from eleven (11 towns, were examined, and in no case was there any evidence of mineral addition.

In Washington, of fifty-eight (58) specimens of flour collected from military posts and depots in different parts of the country, examined, only one contained matter foreign to the wheat kernel, and in this case the adventitious substance was corn meal, evidently introduced by accident.

Dr. Smart explains why there is no temptation here as in England to mix bean flour, by the fact that as twelve per cent of gluten is necessary for good bread, and we have flour up to 17.5 of gluten, these so-called strong flours may be mixed with the weaker ones, thus bringing the nitrogenous matters up to the standard without the use of beans.

BREAD.

Unfortunately, in our country the same purity cannot be predicated of the bread, *i. e.*, of the so-called baker's bread as distinguished from the home-made, or domestic bread.

Of eighteen (18) samples of bread in Washington, D. C., eight (8) contained alum.

Dr. Waller, in the fourth annual report of the Health Department of New York City, reports upon the bread sold in that city: of fifty-one (51) samples, forty-one (41) contained no adulterant; two (2) contained copper, probably added as the sulphate; six (6) contained an excess of alumnia; and two (2) both alum and copper.

It may not be out of place here to state that the whole question of the injurious action of alum in bread appears to be still undecided.

English bakers have certainly used it since the time of Henry VIII, for there is a household ordinance of that doughty monarch threatening his court baker with the stocks for using it; they still use it, notwithstanding the adulteration act, as the report of English analysis shows. Now it has never been clearly proven in all this time that the small quantity used had a directly injurious effect upon the human stomach; the alum is said to be converted into something insoluble and inert during the process of punification; it certainly has been shown by Professor Patrick, of Kansas University, to be unaffected by the juices of the stomach.

CORN MEAL.

In Washington, D. C., of the samples examined all were found of excellent quality, and free from any extraneous matters.

OATMEAL.

No account of any examination of this excellent food product, now largely manufactured in our State, is at present accessible, but no doubt the result would be equally favorable.

SUGAR.

The varieties of sugar commonly used in this country are in the order of purity, loaf, granulated, and powdered, white; light, and dark brown, colored.

Sand, which was the oldest of adulterants mentioned by writers, has disappeared, except as an accident. Another indication of impurity which could twenty-five years ago be found in almost every sample of brown sugar, even in those of good quality, *i. e.,* the acarus, seems to have almost entirely disappeared, probably from some change in the process of manufacturing the brown sugars.

Chloride of tin and chloride of lime are also mentioned as adulterations of sugar, the former being used by the refiners to improve the color of the sirup and the resulting sugar, the latter derived, either from the water, or the lime used in boiling the cane juice.

But there is a more common adulterant in use, which, as it is largely made in this State, deserves more consideration than the others. Glucose, or grape-sugar, is made by boiling corn starch with dilute sulphuric acid, and afterward precipitating the acid by means of lime. The samples examined by me had the appearance of tallow, being in a solid mass, with a waxy and with a somewhat conchoidal fracture, it is not more than half as sweet as pure cane sugar, owing to its less rapid solubility in the fluids of the mouth and fauces. It has a decidedly bitter aftertaste, more perceptible to children than to adults, the sensibility of whose palates has been blunted by the use of condiments. Whether this bitter aftertaste is a property of pure glucose, or, as is more probable, is the result of the retention of some product incidental to the manufacture, is not stated in any account at present accessible to me. If the lime used contained magnesia, the resultant sulphate of magnesia (epsom salts) would not be precipitated, and clinging to the glucose, after the boiling down would taste bitter. The bitter taste may also be the result of the formation of salts of lime with glucose (sucrates or sacchyrates or oxysacchyrates), all of which are said to have a more or less bitter taste. Glucose, when dissolved in water by boiling, made a sirup of a rich maderia wine color, which was used in my family, though the children objected to the bitter aftertaste.

The manufacture of glucose has been but recently commenced in this country, and the product at first was almost entirely exported. It is not yet very extensively made (owing to the supply of technical or expert labor being far below the demand), but is used in the manufacture of the soft kinds of confectionery, the preservation of fruits, the formation of sirups, and, also, for the adulteration of sirups and sugars.

Now, though this is a fraudulent, it is not in any sense a harmful or deleterious, addition, for there is no doubt that glucose is a wholesome and nutritious article of food; indeed, all the cane sugar we eat is changed to grape sugar, or glucose, in the process of digestion. As there must be some loss of force in this process of conversion, it stands to reason, physiologically speaking, that glucose is a better food than cane sugar.

Having used it freely in my own family, I am satisfied as to its wholesomeness as a food. However, it should be sold under its own name, and could be afforded at five (5) cents a pound, and should not be mixed with cane sugar, and sold at ten (10) cents.

Glucose exists in a considerable quantity in honey, sorghum, sirup, and molasses, and none of these commonly eaten articles have been found injurious.

Quite a panic was produced within a few years by sensational articles in the papers on the subject of glucose, and in one State at least (Connecticut) a law was passed forbidding its sale. The law, however, has never been enforced, and in the Third Annual Report of the State Board of Health of Connecticut, occurs the following language: *"The law passed at the last session concerning the sale of glucose is entirely* *uncalled for. Fortunately no attempt has ever been made to enforce it.* * * * *It should, however, be at once repealed, as it might be used maliciously."* Various modes of detecting glucose have been devised: When mixed with cane sugar, if the latter be dissolved out by a saturated solution of starch sugar in methylic alcohol, under a microscope the rounded dull looking grains of glucose may be readily distinguished from the bright, clearly defined crystals of cane sugar. Another mode, founded on the comparative slowness of the dissolution of glucose in cold water, is to place the suspected mixture in a beaker or watch glass and add thereto a small quantity of cold water; the cane sugar, or at least a portion of it, quickly dissolves, and the refrangibility of the remaining crystals being nearly the same as the resulting sirup, hides these, and permits the particles of slowly dissolving glucose to be plainly seen as specks. Still another mode of detecting glucose is to let dissolve in the mouth a pinch of pure powdered cane sugar before tasting the suspected sample; if glucose is present, a decidedly bitter taste is developed; chloride of tin may also be detected in this way.

But for the detection of glucose in honey, sorghum, molasses, and some other sirups, as also in the brown or muscovado sugars, which all contain a certain proportion of glucose, none of the above processes are applicable. Here the best mode is after finding out the proportion of glucose by chemical analysis in a normal specimen of any of the above, to compare it with the quantity found by analysis in the suspected sample; any considerable excess in the percentage of glucose being rated as adulteration.

Some sugars contain sufficient iron to blacken tea in which they are dissolved; this, though unpleasant to the sight, does not render such tea deleterious, as the iron (which comes from the vessels used in making the sugar) is in very small quantity.

RECENT EXAMINATIONS OF SUGAR.

In 1879 the public analysts of England examined two hundred and thirty-four sugars, and found but one of the specimens adulterated.

In 1873 one hundred and nine samples of powdered sugar were reported by the health authorities of New York City as free from glucose, and the purity of the sirups and brown sugars sold in that city was established.

In a paper read before the American Chemical Society on March 4, 1880, Mr. Casaniajor, a chemist constantly engaged in the examination of sugars, stated that he had that week for the first time had the good fortune to come in possession of a sample of refined sugar largely adulterated with glucose; and that it came from St. Louis, and was marked "powdered sugar."

In 1879 Mrs. Richards examined seventy-five sugars from seventeen towns, with the following results: Not one of the sugars gave reactions for tin. Of the white sugars not one gave reactions for chloride of calcium; one only out of the fifty-five gave any indication of glucose, and that in a faint degree. Of the thirteen brown sugars, one gave reactions for chloride of calcium. The worst two of these were analyzed, and gave respectively three-tenths and four-tenths of one per cent of chloride of calcium and chloride of sodium or salt, a quantity that might have been derived from the water used in the process of manufacture, and too little to do the least harm. Of the thirteen brown sugars, six gave traces of reducible sugar or glucose, and three only gave considerable amounts, 8.3, 8.6, and 11.1 per cent respectively. Two of the three samples were of the darkest color found, and undoubtedly contained some molasses, which always carries a large per cent of reducible sugar or glucose, formed in the process of the refining of the cane juice. As honey is almost entirely composed of glucose, it is difficult to see wherein the "*dangerous qualities*" of the molasses glucose lie.

In 1879 Dr. Kedzie says: "I have analyzed a large number of 'granulated,' 'crushed,' and 'powdered' sugars without finding glucose in a single instance.

"In sugars not so distinctly crystalline, such as the various grades of coffee sugar, brown sugar, etc., adulteration by glucose is more feasible.

"In one specimen of coffee C I found 5.75 per cent of glucose; in another 2 per cent; in two others 1⅜ per cent; in extra C 1⅞ per cent; and in A 1 per cent. This does not show any heavy adulteration." (*Dr. Kedzie, Report Bulletin of National Board of Health, Supplement No. 6, page 32.*)

In 1880 Dr. Smart, U. S. A., gives the following as the result of the examination of sugar in Washington, D. C.: The white sugars, powdered, granulated, etc., were free from glucose; twenty-four were furnished by dealers, and fifteen were purchased. No tin or other unwholesome substances, sometimes stated to be used by refiners, were found in the specimens. But when we came to the brown sugars a very different result was found from those at Boston and New York. Among forty-seven brown sugars, most of which were furnished by dealers who knew that their samples would be examined, there were found three which contained glucose, while among thirty-eight samples purchased for analysis no less than nine were thus adulterated. The glucose varied from a small admixture to thirty per cent. Dr. Smart regards six per cent as the highest even for dark specimens of sugar. In all the specimens of high percentage of glucose microscopic masses of boiled starch are found in the sediment of the sugar solution. This affords another mode of the detection of adulteration by glucose.

SIRUPS.

In 1874, Dr. Kedzie, of the Michigan Board of Health, examined seventeen sirups all purchased of first class grocers and found only two to be pure; the others were glucose and contained large quantities of sulphate of iron and lime; the lowest contained twenty-five grains of the iron salt, and one hundred of lime to the gallon, and the highest fifty-eight grains of the iron salt and 724 of lime. On the other hand, in 1880, Dr. Smart, at Washington, D. C., examined twenty-one samples of sirups from first class grocers, and twelve from the lowest grade stores which could be found in Washington City, and found these specimens without excess of lime or iron, and with such a small percentage of grape sugar, the highest being thirty-five per cent of the total sugar, as to preclude the possibility of an addition of glucose; the entire absence of the indication afforded by masses of starch under the microscope greatly strengthen this position.

According to Hassall golden sirup, molasses and treacle contain, respectively, of grape sugar thirty-three, eighteen, and thirty-seven per cent of the total sugar. Of the great discrepancy in the results of analysis between himself and Dr. Kedzie, Dr. Smart remarks *"that it is difficult to reconcile them except in the assumption that at that time the market was stocked with a manufactured article which failed to please the public taste, and has since disappeared."*

Dr. Kedzie, in 1879, again examined twenty-one specimens of table sirups, and only found one in which the sugar was entirely cane sugar; in the majority of the others the percentage of glucose in the total sugar would average at least seventy-five per cent, called respectively; 1, Crystal drips; 2, Honey drips and Silver drips. There was no cane sugar whatever.

VINEGAR.

According to English law vinegar must contain at least 3.5 per cent of acetic acid (from alcohol), and not more than one-tenth of one per cent of free sulphuric acid. In this country the prevailing defect with vinegar, as in the parallel case of milk, is too much water.

Dr. Smart's examination of fifteen samples in Washington, D. C., showed the only adulteration to be dilution by water; three specimens had less than three per cent of acetic acid. Traces of iron were found, but no copper, lead, or other dangerous metals were found, nor any free mineral acids. Two specimens were alive with anguillula (vinegar eels), and these were fair samples of good vinegar.

Dr. Paton, the analyst to the Commissioner of Health in Chicago, during the past year examined twenty-four samples of vinegar, and found four worthy of condemnation; one for containing copper, and three for dilution containing only one and one-half, one and three-fourths, and two and one-half per cent of acetic acid; the latter also contained free muriatic acid.

PICKLES.

These generally have the same adulterations as are found in vinegar, from which they derive whatever they may have.

Highly colored pickles should be avoided, as these, both in England and in this country, have been found to contain copper in a noxious quantity.

COFFEE.

In this State, to prepare this popular and fragrant beverage, the coffee is either bought in the green state, then roasted and ground at home, or bought in a roasted state from the grocers and ground as it is to be delivered, neither of these modes of preparation leaves any room for adulteration. But those who use ground coffee put in packages, and still more probably the few that use the so-called "coffee essences," are very apt to get a very sophisticated article, much chicory, leaves, rye, etc., and very little coffee.

Although a mixture of chicory, and coffee, if so labeled is permitted by English law, yet the former continues to be used as an adulterant, for in 1879, out of 1,244 samples of coffee examined by the analyst 236 or 18.9 per cent contained chicory. Dr. H. B. Hill (fourth annual report of Massachusetts Board of Health) examined ten samples of ground coffee, bought in bulk, and found them all pure; while of seven samples of package coffee, one contained no coffee at all; two very little; and four from fifty to seventy per cent of coffee, the rest being roasted wheat, peas, beans, and chicory.

In Dr. Smart's examination of ground coffee in bulk or loose coffee, of twenty-five samples three were found to contain either chicory alone or chicory and beans; one package of coffee was examined and found to contain no coffee whatever. The same might also be said of three samples of extracts or essences of coffee, one of which consisted of chicory, and the two others of roasted starches.

The adulteration of ground coffee is most readily detected by the microscope in the hands of an observer already familiar with the appearance of pure ground coffee; the readiest practical test is to make an infusion of known strength and compare it with an infusion of pure ground coffee of the same strength; afterward a comparison of the dregs of the two infusion, would confirm the conclusion, or remove any doubt in the mind of the observer, after tasting the two infusions.

TEA.

From a recent "trade circular" we learn that the principal grades of tea now known to American consumers are as follows:

Black Teas—Oolong: Formosa, Amoy, Foochow, and Ningyong; English Breakfast: Congon, Souchong, Tarry Souchong, and Assam.

Green Teas—Japan: colored and uncolored or "basket fired." Other green: Gunpowder, Young Hyson, Old Hyson, and Imperial.

Mixed Teas—Oolong and Japan: Oolong and Gunpowder or Hyson or Imperial.

The annual consumption in the United States at present (1880) is as follows: Japan (green), 35,000,000 pounds; other green teas, 20,000,000 pounds; black tea of all kinds, 15,000,000 pounds; total, 70,000,000 pounds.

A tea sold at a lower price than thirty cents per pound is apt to be spurious or adulterated with other leaves. The greater part of the pure tea is sold at an average of fifty to sixty cents per pound.

Hassall gives the following terrible list of adulterations of tea divided in three categories, those added to increase the weight; to improve the color; or to somehow modify the taste or smell; exhausted tea leaves other than those of tea as sycamore, horse-chesnut, plum, tie-tea, paddy-husk, sand, quartz, magnetic oxide of iron, starch. plumbago, gum, indigo, Prussian-blue, turmeric, Chinese yellow, China clay, soapstone, mica, sulphate of lime, sulphate of iron, catechu, gum, Chinese botanical powder.

From this author, and from many articles in the current literature of the day one might readily be led to believe that adulterated teas were quite common, that indeed it would be a difficult matter to find any pure specimens in the United States or in England. Such, however, is not the case, the adulterated teas being in a decided minority in both countries.

In England the tea, before being admitted for home consumption, is sampled and examined by sanitary inspectors. In 1879 the result was the following: of 575 specimens only seventeen were of such a character as to require the board's direction as to their disposal, but as fourteen were allowed to be delivered without any restriction there remained only three for special action, and only one of these (fresh water damaged) was condemned to be destroyed, while one with old and exhausted leaves was allowed to be delivered for exportation only, and one (plundered in China and the weight made up with sand) was sifted and repacked.

We have in this country (as we should) no such system of customhouse inspection, but, were it in existence, equally favorable results would probably be shown.

Dr. Smart examined 109 specimens of tea derived from various sources and of them five only were fraudulently adulterated: one Gunpowder, from an excess of lime sulphate facing; one Imperial, from an admixture with sand; and three Imperials from the presence of exhausted leaves; these were all green teas.

Of these adulterations Dr. Smart remarks: "*Whether these debasements were affected in China or in this country is an open question, but from the character of the English importations it is probable that exhausted leaves are dried and recolored in this country for sale among the poorer classes of the community.*"

In this country, where the great bulk of the tea consumed is green, the outcry has naturally been against the coloring ingredients used in China and Japan for the so-called "facing"; but the extent, the deleteriousness and the intent of the additions have all been most grossly exaggerated and misrepresented. The amount of Prussian-blue in Chinese tea, or of indigo with sulphate of lime and silicates in those of Japan, must be small indeed when, as shown by Dr. Smart's analysis, "*some of the greens which were examined contained less mineral matter than the unfaced black teas.*" Such small amounts of the above ingredients could not in any reasonable manner be considered as positively injurious.

This facing is found in the best qualities of tea, and though the practice may have originated in an attempt to deceive in some way, yet such is not the case now, as all green teas are bought for importation with a full knowledge on the part of the purchaser of the existence of the facing.

The proper examination of tea is a delicate and difficult task, only to be undertaken by an expert who combines the attainments of a chemist, a microscopist, and a tea-taster.

BUTTER.

In this country, until quite recently, the only foreign ingredients to be found in butter were the small quantities of water and curd, or caseine, left behind in greater or less quantity according to the comparative perfection of the process of making; and the modicum of salt added for its savor and its antiseptic quality, with annotto for coloring.

The English law limits the quantities of these ingredients, as follows: Water not to exceed fifteen per cent, the curd five per cent, and the salt eight per cent.

But now the markets seem to be plentifully stocked with quantities of imitations of butter produced by the substitution of foreign fats, as those of the beef, mutton and pork, for those indigenous to butter.

These various articles are called by many names, as oleomargarine, butterine, suine, etc., and these terms are frequently used by writers in the daily papers and others as, if not exactly synonymous terms, yet as indicative of closely allied products.

But such is not the case, and, as in every other investigation, so there nothing is perhaps of more importance than a proper definition and understanding of terms. Butterine and suine are admixtures of real butter of poor quality with lard, one hundred pounds of butterine, generally in Chicago, containing twenty-seven and one-half pounds of butter, sixty pounds of lard, and twelve and one-half pounds of salt. The lard (beef-fat) is melted at a low temperature (150° to 180° F.) and then bleached, becoming, when solid, white, and crystalline like snow.

This process seems to have originated in Cleveland, where it has been carried on for many years. It has extended also to Chicago and perhaps to other cities in the West; in the East, *i. e.*, in New York

State (as we shall presently see), this prepared lard is used to adulterate cheese quite extensively, but whether butterine is also made in that section does not appear.

I have had in my possession a sample of butterine made in Cleveland, and sold there by wholesale at seventeen cents per pound, which was a good imitation of ordinary country butter. It deceived an old butter-making farmer, and was readily consumed by my family when placed on the table.

Oleomargarine butter is quite a different substance, a much more dangerous counterfeit, so resembling the real article in taste, smell and other qualities as, it is said, to deceive the most clever and experienced experts. Indeed, the only certain mode of distinguishing the two is a chemical analysis, which will show the deficiency in the quantity of volatile fatty acids in the oleomargarine butter, only 1.8 per cent as compared with 7.5 per cent in true butter.

Oleomargarine butter, as made according to Mott's modification of Mége's patent of 1873, is prepared as follows :

Beef suet (the caul fat), after being most minutely crushed and divided in a machine, is melted by steam heat at a temperature of 125° F.; this, when again solid, is pressed in cotton bags at a temperture of 80° F., the stearine is left behind and what flows out is the oleomargarine oil; immense quantities of which are shipped to Europe, and much used here for the manufacture of soaps, cheese, and, by Mott's process, also butter. Mége's formula was to churn together one hundred pounds of oil, thirty-three and one-third pounds of milk (sweet), three ounces of annotto, and one and one-half ounces of bicarbonate of soda, adding thereto a small quantity of rennet.

Mott omits the last named ingredient as useless, and proceeds as follows:

He first churns one hundred pounds oil, twenty pounds sour-milk, two ounces solution of annotto, and one-half ounce bicarbonate of soda; this flows off through finely divided ice (which takes out the grain), and of this product thirty pounds are re-churned with twenty pounds sour churned milk, for fifteen minutes, then solidified by flowing over broken ice, and placed on the working table, when salt is added in the proportion of one ounce to the pound.

CHEESE.

In cheese the English law allows no foreign ingredients but salt and annotto; but as this coloring-matter is sometimes adulterated with copper. Cheese as well as butter so tinted is liable to show a trace of contamination by that metal. Other vegetable matters, equally harmless as annotto, are used, however, in coloring cheese, as chlorophyl, which produces the duck-green of the Swiss sapsago (schabzeiger), and the beautifully mottled-green of our sage-cheese.

Formerly, our cheese, which was cheap from abundant production, was remarkable for its purity; one would think that an article so cheap would, like flour, corn-meal and lard, have escaped adulteration.

But such is not the case, from some cause or other, probably from the great and rapidly growing consumption of our cheese in Europe, it is largely adulterated, the newspapers teeming with accounts of lard cheese, oleomargarine cheese, anti-huff cheese, etc.; the offending ingredients, being as in the case of butter, lard and oleomargarine oil.

In regard to the use of the latter, Sharples in his article on adulteration of food (Buck's Hygiene, Vol. 2, p. 362), says: "The method of working is to allow the milk to stand for twelve hours, and skim off the cream which is used for making butter. An equivalent portion of oleomargarine, or of pure tasteless tallow oil is then added, and the cheese-making proceeded with in the usual way.

The detection of this fraud is extremely difficult if not impossible. Just the same process is followed in making lard-cheese, as witness the following testimony given before the committee of the lower house of the legislature of New York, by a member of that body. Assemblyman Crapser of St. Lawrence county, among other things said:

"It is necessary to add oil if a richer cheese is wanted. We have never been able to do it in this country until recently. Lard is now substituted in place of cream or butter oil. To one hundred pounds of skim-milk we add one and one-half pounds lard, and have to buy the best lard we can.

"We get it at Chicago or elsewhere and it has to be deodorized (generally by blowing hot steam through it).

"One hundred pounds of skim-milk and one and one-half pounds of lard make ten pounds of cheese, which is of good quality, we finding a ready sale for all we make.

"This new cheese is made from sweet milk, from which the cream has been removed at 40° F., after standing twelve hours.

"No chemicals are used, except some coloring matter, which we make. I have twenty-one factories and have put them to making lard cheese as fast as possible. Seven of my factories are now making lard cheese which goes to Chicago, Boston, New York and Baltimore."

The anti-huff cheese is made by a new method and is described as follows: The skim-milk of three or four days collecting, is heated to 86° and the anti-huff extract added in the ratio of one ounce to one hundred pounds of milk. This extract is composed of an alkali that changes the milk from sour to sweet. About ten minutes after the anti-huff has been added, rennet is applied and the process proceeds much as usual.

The preculiarity of the anti-huff method is its direct contrast to the old practice which works sweet milk up to an acid, standard: by it sour milk is reduced to a sweet curd. Cheese makers who favor the new process explain that anti-huff is an antiseptic which gives to cheese preservative qualities. The extract furthermore imparts a rich color to the cheese. As may be inferred, this invention is looked upon by many as a most valuable one. Others there are who do not favor it at all; but while admitting that anti-huffing produces from skim-milk cheese resembling in appearance full cream cheese, insist that its effects on the human stomach are deleterious. Whether this new departure in cheese-making is to become a permanent one time alone must decide.

SPICES.

Of these, especially in the ground or powdered form, as usually sold in this country, but little need be said, and that is that they are largely and generally adulterated. Dr. Smart's recent investigations showing that they are generally as bad as in England before the passage of the Adulteration Act, as bad as human cupidity and rascality could make them. They contain not only fraudulent additions, but some of them positively deleterious or even poisonous ingredients.

The only safe way for the consumer, as in the case of coffee, seems to be the purchase of the whole or unground article.

BAKING POWDERS.

This substitute for yeast or leaven in bread making, though in such common use with us, is almost unknown in Great Britain and on the continent of Europe, and before the Rebellion was but little known or used in the Southern States. In the latter, two forms of bread were in use, and that they were wholesome foods is abundantly shown by the superior stature, large, strong frames, and good teeth of the large population using them. The forms of bread alluded to are corn-bread made by baking a mixture of *white corn* meal, salt and water; the want of gluten prevents this bread from being light, but it is a very digestible and wholesome bread, notwithstanding, and the addition of eggs makes it not only light, but more palatable and nutritious.

The other form of bread is also an unleavened bread, but is made of flour, and was formerly almost universally used throughout the South. Its ingredients are flour and water, with salt, and a very small portion of lard, butter, or other shortening. Its most common name, beat biscuit, is significant of its mode of preparation. A batch of dough is first made with the shortening, flour, salt and water; this is placed on a firm surface, as a slab of stone or stout table, and while the dough is turned by the left hand of the operator, it is beaten with an axe or heavy club by the right hand, additional flour being added at every turn. When properly prepared and rightly cooked it is light and easily digestible; when broken it is of extreme whiteness, the manipulation it has undergone having filled the mass with air, somewhat after the fashion of bread, artificially aerated by machinery, which, at one time, was esteemed by many as more wholesome than ordinary bread swelled by the production of carbonic acid from fermentation by yeast. But as most of our people prefer the ready method of making bread by the use of baking powders, it is but fair that they should have them as pure as possible, or at least be aware of the more common adulteration.

The best baking powder (which, however, unfortunately, is not a powder) is a mixture of hydrochloric acid and carbonate or bicarbonate of soda, in such atomic proportions as to leave behind only chloride of sodium (common salt), but the fluid nature of one of its constituents renders it unfit for common use.

Another excellent baking powder seldom used, except for the preparation of some fancy varieties of bread, is the carbonate of ammonia, both of whose gaseous constituents are first evolved, and then finally driven off by the heat of baking.

As the carbonate or bicarbonate of soda is the alkaline basis of all common baking powders, we will first consider the commercial purity of this article.

In Diehl's Report on Adulteration of Drugs (National Board of Health bulletin, supplement No. 6), soda bicarbonas, both as produced in England and the United States, is rated as good.

Mrs. Richards (op. cit., p. 60), gives the following as the result of the examination in Boston of ninety-three samples, from thirty-five towns, twenty in packages, fifty-five in bulk, eighteen from known manufacturers. Of these, nineteen were nearly chemically pure; forty-three were good, making a total of sixty-two good; twenty-five contained from three to sixteen per cent of chloride and sulphate of sodium, but of these three only were bad. The common salt (chloride of sodium) and the sulphate are simply left in from the crude soda-ash in the process of manufacture; they are not added for adulteration. We may dismiss the soda without fear; nothing is cheap enough to be used for its adulteration.

Dr. Smart's report is not quite so favorable, but he says: "No markedly fraudulent adulterations were discovered, as with large percentage of terra-alba or starch; but it is probable that if the list of samples had been increased, some notably bad specimens might have been obtained, for in twenty-eight samples reported in the third annual report of the Health Department of the city of New York, while twenty-six were of the ordinary commercial character, one contained flour, and one nearly twenty-five per cent of terra-alba."

But when we come to the consideration of what constitutes (or is supposed to constitute) the basis of the other or acid ingredient of ordinary baking powders we, unfortunately, find a very different state of affairs.

Cream of tartar (both the home and the foreign product), the costly ingredient of baking powder, is described in Diehl's list (op. cit., p. 16) as always containing a small quantity of tartrate of calcium, and is very prone to sophistication, containing gypsum, terra-alba, amylaceous substances, alum, acid sulphate of sodium, etc., etc.; and as sometimes entirely artificial.

Mrs. Richards (op. cit., p. 61) examined in Boston one hundred and sixty samples, from forty towns, with the following result: Perfectly good, seventy-four (being fifty-eight per cent); containing more than three and less than ten per cent of impurities, fourteen; consisting largely of terra-alba, forty-seven; almost wholly of terra-alba, nine; largely of acid phosphate of lime, twelve; wholly of acid phosphate of lime, five; largely of flour, one (twenty-two counted twice as containing both acid phosphate and sulphate from 182—22=160); alum was not found in a single sample.

Dr. Smart (op. cit., p. 4) reports that eighteen samples of cream of tartar were examined, and of these only six were of satisfactory purity; eleven contained sulphate of lime (terra-alba), varying from seventeen to ninety per cent, three having nearly the latter figure; two contained no cream of tartar, but consisted instead: one of sulphate of lime, alum and acid phosphate of lime; and one of alum, acid phosphate and starch.

Considering the use of cream of tartar in baking, its impure condition is a serious evil. The condition of cream of tartar is bad enough, but in many cases the manufacturers of baking powders make bad worse by the addition of other adulterations.

The absolute value of a baking powder depends upon the amount of carbonic acid evolved, unfortunately there is no handy method of testing this, and price does not always indicate the value of any powder.

Baking powders are of three classes, according to the nature of the acid constituent, cream of tartar powders, acid phosphate powders, and alum powders, and should always be so labeled or marked; such is not the case, however, yet while some avowed acid phosphate powders may be found, there are no alum powders in the market.

Mrs. Richards (op. cit., p. 43) examined thirty-eight samples and found twenty-four good, that is, they contained nothing injurious, the worst adulteration being an excess of flour or starch over that needed for the mixing of the cream of tartar and soda. Of the remaining nine, eight contained alum, and five of these eight also contained ammonia (from ammonia alum).

Dr. Smart (op. cit. p. 4) examined eighteen specimens of baking powders (six of which were purchased and twelve furnished by the Commissary Department U. S. A.)

The acid salt of the latter consisted in every instance of cream of tartar. Of the purchased specimens one (1) contained alum, another acid phosphate of lime, while the remaining four (4) consisted of a mixture of these two salts. The alkaline salt was in all the bicarbonate of soda.

DISEASES OF DOMESTIC ANIMALS

AND THEIR

RELATION TO THE HEALTH OF MAN.

PEPARED BY SPECIAL REQUEST

PROF. M. STALKER, B. SC., V. S.,

PROFESSOR OF VETERINARY SCIENCE IN IOWA AGRICULTURAL COLLEGE.

DISEASES OF DOMESTIC ANIMALS AND THEIR RELATION TO THE HEALTH OF MAN.

To the Iowa State Board of Health:

GENTLEMEN—In answer to your request for some suggestions that may have been furnished by my investigations the present year, I send you the following hastily written sketch:

My college work has left me little time for anything outside of that which is necessarily connected with the course of instruction. With the exception of a few serious outbreaks of disease among domestic animals in different parts of the State, my observations have been confined to the class of cases to be seen in general practice. These have been sufficiently varied to possess some degree of value as matters for observation. To the student of comparative pathology these furnish an important field for investigation.

It requires no very profound research to discover the fact that we have, in this State, a large number of diseases among the domestic animals that stand in a more or less intimate relation to the health of the people. With the facts we already have before us on this subject, and the glimpses we are just beginning to get into the undiscovered fields, we have a very strong incitement to adopt measures of precaution.

ANTHRAX.

Many of these diseases we know to be directly communicable to man. When comparative pathology has reached the advancement that present indications give promise of, this list will doubtless be greatly extended, and it is certain that with the crowding together of large numbers of animals, and the adoption of highly artificial methods of keeping, the conditions for the development of disease are greatly enhanced. This is what will inevitably occur with increased population. The nature of the organisms that are the active agents in the production of some of these forms of disease, their transformations and subtile methods of transmission from one animal to another, is a broad field that is just opening to the view of the investigator. We have been accustomed to hear of *bacteria* all our lives, but not till the recent investigations of Pasteur, Buckner and others have we had but the vaguest notions of their life history or of their effects under modified conditions. If a few stalks of hay be taken at random from any of our stacks or mows and the same placed in a small quantity of tepid water and kept at a medium temperature for a few days, the liquid, when placed under the microscope, will be found to be swarming with minute organisms, among others the *bacillus subtilis.* This is a simple experiment that may be performed by any one possessing a good microscope. These organisms are destitute of virulent properties, and a draught of such infusion may be taken with impunity. Again, if we take a drop of blood from an animal affected with anthrax and place it under the microscope, we shall find that the liquid contains thousands of organized objects.

There is the closest resemblance between the bodies we have found in the two examinations. Here are two facts, neither possessing much significance if they stand alone, and have no relation whatever to other phenomena. But when we have gained the additional fact that these bodies are uniformly present in the blood of anthrax patients, and further, that the introduction of the smallest appreciable amount of this infected blood into the circulation of a healthy animal soon causes the blood of the inoculated patient to swarm with countless millions of identical beings, we begin to take additional interest in the subject.

Now, if we return to our infusion of hay, and inoculate a healthy animal with a drop of this liquid, it will be found to possess no septic properties whatever. Here is a wide range of difference between the action of the living organisms derived from the different liquids, when they are transferred to the circulation of healthy animals. Recent investigations however, have established a kinship between these two forms of life, that proves them both to belong to a family that kills.

While the *bacillus* from the hay infusion is found to be a harmless creature, yet, under certain carefully regulated conditions of development, it is found to acquire highly malignant properties. In fact there is complete identity between the cultivated product from the infusion of hay and that from the blood of the anthracoid subject. This experiment of developing the *Bacillus subtilus* of hay into the *Bacillus anthracis* of the deadly anthrax has been successfully performed. This cultivated liquid has been used for experimental inoculations, and has resulted in the production of malignant anthrax.

If a heavy fall of rain leaves surface-water standing on a meadow, and a few hot days immediately follow, a drop of this water will be found to contain germs identical with those obtained experimentally from the hay. It may be asked, Why, then, are these conditions not always followed by and outbreak of anthrax? It is only when the conditions are carefully regulated to the necessities of the case, that the innoxious germ grows into the malignant type of the fully developed organism. Nature does not always—nor even once in thousands of cases—furnish the continued succession of conditions necessary to perfect the changes.

A full supply of oxygen is destructive to the germs, and this is Nature's method of keeping in subjugation a part of her creation. These bodies assume an infinite gradation of activity just in proportion to the conditions furnished for their development. So they may become active agents in the disturbance of health without producing true anthrax. This fact has been taken advantage of in the cultivation of liquids, for the purpose of inoculation. Both Pasteur and Buchner have succeeded in the cultivation of liquids which, when used for inoculation, have produced but slight symptoms of the disease, and yet the animals enjoyed immunity from further attacks.

Again, it may be asked, Why are not these these outbreaks indefinitely extended when once the germs have attained to the height of their activity and are capable of reproducing their kind? Unfavorable conditions will so readily devitalize the active germs as they will produce the reverse changes. The conditions furnished by the circulating fluids of the body are probably the most favorable for the development of these germs. Here they are excluded from free contact with oxygen, yet there is sufficient to promote their rapid generation.

Though the circulating blood furnishes highly favorable conditions for their perpetuation, they will, nevertheless, retain their vitality for many years after they have been removed from the body. It has been shown that earth-worms can carry their living bodies from the graves of anthrax patients many years after they have been interred, and in this way cause an outbreak of the disease.

I have been consulted on several outbreaks of anthrax during the present summer. It is by no means an easy matter to determine the exact causes that have operated to produce these outbreaks. The heat and floods of the summer months have furnished highly favorable conditions for the development of anthrax germs. The heavy fall of rain may in some instances have percolated through the graves of animals that had died from the disease, and afterward found its way to the surface, charged with the poison. It will thus be seen that the opportunities for the spontaneous appearance of the disease are numerous, and that the immediate cause is often very obscure.

Hundreds of animals die every year in the State from anthrax, and doubtless many of these cases occur from the imperfect manner in which the former victims of the disease have been disposed of. The bodies should either be burned, or deeply buried where stock will not be allowed to go. The disease is communicable to man and other warm-blooded animals. A mouse inoculated with anthrax blood in the college laboratory, died in forty-eight hours, with manifest symptoms of the disease.

GLANDERS.

Glanders exists, or has existed during the summer, in several counties of the State. I have examined the stock in some of the infected districts. All the cases I have seen have assumed the chronic form, a type of the disease all the more dangerous, as it is far more likely to be mistaken for some other form of disease. Some of the affected animals have been doing regular work for a year or more, and all the while exposing men and other animals to the contagion. One of the misleading conditions of the disease is the fact that with the exception of symptoms that seem to be very trivial, horses may appear to be in the best of health, and do their regular work with no inconvenience. It is particularly fortunate that in this form the disease is not highly contagious, else incalculable damage would result from the spread of the disease. Glanders is actively contagious by inoculation. The contagium is volatile, and can be communicated to horses at a considerable distance. The disease is communicable to man by inoculation, and possibly by infection. In man the disease is characterized by the same symptoms that mark its progress in the horse. It is almost certainly fatal in the course of time, and every year adds a greater or less number of victims from the human family.

TUBERCULOUS DISEASE OF CATTLE.

Tuberculous disease of cattle is another malady that is to be regarded with the gravest suspicion. Its history, symptoms and pathology simulate so closely the kindred disease in man as to leave their identity hardly problematic. The feeding of milk from tuberculous cows to small animals has in a number of instances developed in the latter well marked tubercles, with the accompanying symptoms of the disease. There is no good physiological reason why a similar experiment performed on a human subject would not be followed by similar results. A large number of cases have come under my observation, and the fact is evident that high-bred cattle are especially subject to the disease. The flesh and dairy products of tuberculous cows are to be strictly avoided as articles of food, as being liable to induce one of the most hopeless forms of disease, human consumption.

DIPHTHERIA AND TYPHOID FEVER.

The possible connection of garget with diphtheria is well deserving the attention of scientists. Typhoid fever is another disease that finds its victims among the lower orders of animals, as well as among men. The peculiarity of typhoid development renders the disease especially liable to be conveyed from the horse to man.

INFECTED MEAT.

Had I not already extended this paper beyond the limits I had intended, I would take pleasure in bringing to your attention some of the diseases that result from entozoa derived from the flesh of animals that furnish our great meat supply. The flesh of the swine, the ox and the sheep all contain the larva of parasites that in the mature form becomes the much dreaded tapeworm.

The *Trichina spiralis* is a frequent occupant of the flesh of the swine. I have had occasion to make examinations of some of the trichinous subjects. The life history of these entozoa is full of interest, and it is of vital importance that the masses of the people be better informed as to the sources of danger from them, and the precautionary measures to be pursued.

M. STALKER.

Iowa Agricultural College, Ames, September 27, 1881.

SEWERAGE, DRAINAGE,

AND

DISPOSAL OF EXCRETA,

BY

JAMES L. LORING,

CIVIL ENGINEER IOWA STATE BOARD OF HEALTH AND CHAIRMAN OF
COMMITTEE ON SEWERAGE AND DRINAGE.

SEWERAGE, DRAINAGE AND DISPOSAL OF EXCRETA.

To the President and members of the Iowa State Board of Health:

GENTLEMEN—Immediately after the designation, at the May meeting of your Board, of a committee on the preparation of a paper on "Sewerage, Drainage and the Disposition of Excreta," a large number of circulars containing questions which might have a bearing on these subjects were sent to the principal points of the State directed to physicians and other parties who were deemed to be interested in the general improvement of the health of the citizens of Iowa. A copy of such circular is hereto appended:

DEAR SIR—In the preparation of a paper upon Healthful Homes, for the State Board of Health, the Committee on Sewerage, Drainage and Disposition of Excreta is desirous of obtaining information upon the following points, and will feel under obligations to those correspondents of the Board who will consider them and communicate with the committee:

1. What is the nature of the soil and the geological formation in your location?
2. What is the practice in your neighborhood in regard to the use of tile-draining the ground upon which the dwelling is erected?
3. What, in your opinion, is required to render a house and its surroundings healthful in your locality?
4. What has been your experience in regard to the location of dwellings in your vicinity as regards immunity of families from different forms of disease?
5. From what source do the inhabitants obtain their drinking water, and that used in cooking? If from wells, what is their average depth? In what manner are they constructed? Are they liable to receive surface-water?
6. Do the houses usually have cellars, and if so, are they walled with stone, ventilated, clean, and free from water?
7. What is the usual mode of disposing of the animal excrement, or fæcal and urinary matter?
8. What is the usual mode of disposing of the waste water and kitchen wash?
9. Please give your views upon any matters pertaining to the construction and maintenance of sewers and drains.

N. B. Please forward your reply within two weeks, if convenient, to

JAMES L. LORING,
Civil Engineer Iowa State Board of Health.

DALLAS CENTER, IOWA, May 20th, 1880.

To these questions quite a number of answers have been received, and as they contain information from various portions of the State which may be of interest to those seeking locations therein, are made a part of this report and annexed thereto.

Although the circulars were sent to persons of different occupations, and presumably to those who were amply qualified to reply understandingly, yet it will be seen that the physicians alone have considered the matter as worthy of attention.

It is certainly a source of congratulation that those to whose skill are entrusted the care and welfare of diseased humanity and the care of results, evince themselves equally zealous in assisting in the prevention of causes. To all who have so kindly taken valuable time to answer the circulars sent to them your committe return heartfelt thanks. I am indebted to the engineer of Chicago, to whom a circular was sent, for some information, and under the head of "Sewerage" his answer to question No. 4, with some remarks thereon, is appended.

Believing that these answers are an average representation of the usual conditions throughout the State, this report will be confined to the consideration of "Sewerage, Drainage and Disposition of Excreta."

SEWERAGE.

Sewers are as old as the cities of the ancients. They were in use among people whose existence ceased centuries ago, and whose relics alone are the evidence of former human habitation. Beneath the ruins of Babylon, and the cities of Assyria, at Jerusalem and Rome, in Egypt, everywhere that the foot of the modern explorer has trodden, below the debris of centuries of destruction by war or time are found almost intact the great aqueducts, canals, conduits and sewers of nations whose history is recorded only in hieroglyphics, or altogether shrouded in the mists of antiquity. Even in America, among the traces of the deserted cities of the mound-builders, whose record not even tradition preserves, are yet found the remains of sewers. Wherever men have congregated in large bodies the absolute necessity of providing means to carry away the offal of daily life has evidently presented itself.

EXPENSE OF SEWERAGE.

The present system of sewerage in the United States is yet in its infancy. One great drawback to absolute success is the expense. A city of ten thousand inhabitants recognizes the utility of sewerage and at a small outlay, which yet is considerable, taxes itself to build a sewer. Suddenly the city with the magic growth of the western continent has expanded to a metropolis of twenty thousand, and more sewerage is imperatively demanded. Before the old debt is paid, a new one must be contracted to suit additional wants. The extensions are made, and then it is found that the old main sewer is insufficient to carry away the extra volume. That which was ample for one is inadequate for two. Naturally, then, the question of finances must govern the construction and maintenance of sewers even more than any other consideration. The need of them has been demonstrated for untold centuries, and is beyond argument now. The city of Iowa desiring sewerage has only to arrange for the cost. Engineers are not wanting capable of constructing the work in accordance with the means furnished. The citizen of extensive reading advocates the cut stone cloacæ of Rome, or the rock-drilled drains of Jerusalem, but the conditions of our civilization preclude such works, as it is no longer in the power of one man to compel a nation's labor. It is apparently not difficult to raise money to build a railway or a factory, set afloat a line of steamships, or institute any one of the thousand sources of commercial prosperity or mercantile wealth. These undertakings all bear on their face plausible hope of remunerative dividend. The sewer, on the contrary, is literally buried capital, a source of expense rather than of income. Only when men are brought by actual experience to a realization of its desirableness as an institution paying its interest over and over again in removing causes of sickness, and returning the outlay in drafts payable in renewed health, exceeding in value the stocks and bonds of bank or railroad, is its necessity a recognized fact.

POSITION OF THE STATE BOARD.

In taking into consideration the construction of a sewer, when once determined upon, no absolute, definite rule *can* be given. It is not in the purview of this report to offer any plans which, however feasible and advisable in some situations, might be wholly useless elsewhere. It is to be presumed that the State Board of Health acts greatly in an advisory capacity, laying down no special dicta outside of the law creating it. Its fixed term extends over a period of years, and definite instructions can scarcely be expected on all matters coming within its cognizance until at least some portion of its time shall have been spent in making inquiry and making examinations, the result of which will render their suggestions valuable. To lead the people of Iowa to understand that, beyond merely living, it is desirable to live cleanly, and so secure the blessings of health, appears a needful step. More advanced and awakened public sentiment may demand more certain information. Thought once awakened will lead to wish to do, and competent instructors are never wanting when the demand exists.

SEWERS FOR DIFFERENT TOWNS.

The practicability and efficacy of a sewer, depends largely on the surface of the ground on which the city requiring it is built.

Evidently cities situated on broken ground, or with a river as its boundary, as is the case with many of the cities of Iowa, have had the question solved for them in advance as to the debouchment of the sewer.

But many inland towns, growth of railroad connections, are situated on almost level prairies, and have only small descent in any direction. To these, at some future day, will come the question of a sewer outlet. Of this, mention will be made later.

Further must be considered the present and prospective area requiring sewerage, the character of the soil, the average rain-fall, water supply, average amount of sewerage to each individual, and materials best adapted for building. These are all absolute conditions, and can only be determined by careful and intelligent survey. The soil may require, from its looseness, extra support, excavation may be difficult and costly.

THE MAIN SEWER.

Above all, the form of the main sewer, its internal and external construction, so that it may have a continuous fall and present no projection nor acute angle for the accumulation of heavy refuse, is an important item for study. The question for future utility and demand is an important one. A plan decided on to-day may not suffice to accommodate the increased growth of the population at the time of, or shortly after, the completion of the sewer. Every financial nerve should be strained for the beginning, and the sewer constructed of generous dimensions from its inception. If of brick, it should not be less than four and a half feet in diameter, and as much larger as possible.

SHAPE OF A SEWER.

It seems to be well established that the internal shape should be that of an egg, with its small end downward. This has the effect of deepening by contraction, the current at the lowest portion, and increasing the power of the water in washing away the sludge. As a natural consequence, the coarser offal sinks, and if the sewer is round or broad on the bottom, a deposit is formed over which the flow of water passes without having much power of removing the settlings. The egg shape permits the water to have the same effect as it would in a river where the banks contracting form a cañon.

MATERIAL FOR A SEWER.

Sewers have been constructed of many different materials; baked clay in rings, brick, artificial and cut stone, and iron pipes. Doubtless these last are really the best. Presenting a perfectly smooth inside surface, they are easily *flushed* by the introduction of streams of water, and not being porous are easier disinfected and less liable to accumulate gases.

The intercepting sewers are readily attached by flanged openings absolutely air and water tight, and the advantage of introducing the small sewers from the houses along its line by right angle connections, also secure from leaks, more readily attainable.

Brick must be laid in cement. The centers of the arch require constant setting and removal. Every inch of brick turned must be supported by solid benches, as the joints are continual. Every variation of soil at the bottom of the trench requires a different foundation. That which is ample in clay soils is not sufficient in quicksands. The joints of iron pipe being longer receive their supports sufficiently at their ends, and cannot sag in the middle. The requisite amount of excavation for a brick arch, with its supporting benches, is greater than an iron pipe. The pipe is more readily removed and is of some value if time demonstrates the need of a more extensive conduit. Brick once laid are of little use afterward if removed, and unless of an extra uniform hardness it is useless to employ them in underground works.

Stone is not desirable unless cut, and expense, as well as the fact that in much of Iowa stone is either a rarity or mostly a soft sandstone, precludes its use. Artificial stone pipe requires, or should have, as much support as brick work, and is also too porous and varying in density to make it a sure success for permanency.

VENTILATING SEWERS.

Another condition of valuable sewerage is some system of ventilation. This has been effected in many cases by open grates at the corners of streets, with a pool or box at the bottom of the sewer, where the washings of the gutters settle, and the water is useful in flushing the sewer. In such an arrangement, the amount of water likely to pass into the sewer from heavy rain-falls, must be taken into account. If the sewer is too small to carry the flood, back water is caused, sewerage is driven back, drains are choked up, and evil must result. The grating can be raised to clean out the box beneath. But this system is said to have pernicious effects. The meat in a butcher's shop, situated near one of these openings, has been found to be tainted by the escaping gases.

The method which will most certainly facilitate the escape of generated gas, is by the introduction of small pipes in the top of the sewer, leading them along just above the sewer, connecting several together, and at given distances permitting them to open either chimneys or ornamental iron street-pipes, running up high enough above the surrounding houses to allow the gas to escape without injury to anyone. This is an absolute essential. It is not the sewerage but the gas it generates by decomposition, that kills. The connection of the pipes from the houses into the main sewer should be carefully guarded. It may be made, of course, by small pipes adapted to the required amount to be removed. This connection should be made at a descending angle into the sewer, and at a right angle to it. There cannot then be any deposition caused by an eddy, which would certainly exist if the pipes entered the sewer at an obtuse angle. Examination will demonstrate this at the mouth of any of our water-courses. Added to the necessity of a careful connection between the house pipe and the main sewer, is the imperative demand for a "trap." These are of various forms, generally a direct and inverted U shaped bend in the pipe, which filling with water, seals the pipe so that the gas from the sewer cannot flow back. These traps are sometimes furnished at the bottom of the U bend with a plug which can be removed and the slit cleaned out. Traps are essential, and require care in the owner of the house not only to see that he gets the best of its kind, but that it is properly put in and kept clean. They are inserted at the outlet and beneath every sink and water closet in the house, and if in connection with them is attached a small pipe leading from them up through the chimney, or by passing outside the wall and there continued on above the building, the danger of gas accumulation is reduced to a minium.

THE TRAP SYSTEM.

The success of traps depends greatly on the plumber who puts them in, and only a thoroughly honest workman should be employed. They should be exhaustively tested, as on them depends the health of the household. Although no pungent gaseous odor is perceivable, still silently and without warning, the germs of disease from decaying organic matter, float out on the air and unconsciously breathed into lungs predisposed to weakness, do their deadly work. As stated above, the reply of Samuel S. Greely, Esq., city engineer of Chicago, to question No. 4, is inserted in this connection. It may serve to show that even knowledge and science are taxed in vain for a solution of the question of the avoidance of the deleterous effects of sewer gas. Mr. Greely says:

> My house is a three-story modern house on stone basement, raised above the level of the street. It has two water-closets, three sinks and set basins, connecting with street sewer. The house is sunny, well warmed and ventilated. Opposite are some dozen poor tenement houses crowded together, standing several feet below the street, crowded with families and swarming with children. They have no sewer connections and use privies on the back of the lots. I have had in my house within the past four years three cases of scarlet fever, two of measles, and one of diphtheria, the latter and one case of scarlet fever being fatal. My water-closets and sewers are in good order so far as I can see. During the same time there has been but one case of serious sickness among the children of my opposite neighbors, and that was not fatal. I do not know how to account for this marked difference in health, except that my sewer connections caused it.

Mr. Greely's communication may serve to set others thinking who have had similar experiences, and show the absolute need of extraordinary care and watchfulness in the construction of sewerage traps and connections. We cannot ascribe the effects of our own carelessness to Providence, and wonder, that, surrounded with all modern conveniences, ourselves, our children sicken, and die, while those of our poorer neighbors grow and flourish. Dibdin sings:

"There's a sweet little cherub who sits up aloft
To watch over the life of poor Jack;"

But it is to be presumed that if Jack did not keep a firm grasp on the ratlines no cherub's wings would suffice to bear him up. Any volatile oil such as turpentine, having a penetrating odor, poured into the uppermost sink or water-closet will betray below where any leak exists. If every joint is tight, and every trap perfect, no smell will be perceptible. But the oil will assuredly betray any rift where gas can escape.

THE PLACE FOR SEWER DISCHARGE.

Upon construction of the sewer the place of discharge is a question to be well considered. This has generally been effected in the nearest body of water. But contamination of the water rendering it unfit for use has been the result. In the cities of Europe large tanks have been constructed, into which the sewers empty; companies have been formed and by the use of charcoal, sulphates, limes, ashes, soil and similar substances, have utilized the deposit by manufacturing fertilizers.

It is yet a mooted, vexing question, what to do with sewerage. As our State becomes more densely settled, those who live on its rivers below the embouchure of city sewers, will certainly combine against poisoning of the waters, rendering them unsafe for the users.

It must sooner or later become imperative with inland cities to provide for the final disposal of their sewage.

The most effective way, probably, will be by the purchase of ground sufficiently removed from settlement, and the construction of reservoirs, and the utilization in some way of the sludge. London has over two thousand miles of sewer, costing over £30,000,000. These are led to the distance of seven to eight miles, emptying into enormous reservoirs, the sewage being partly removed by the tide and partly manufactured. Paris has over two hundred and fifty miles of magnificent sewers, through which boats can pass, which empty into the Seine many miles below the city.

Both of these are the growth of seven or eight centuries, and are not adduced either as standards of comparison or as subjects of rivalry for the newer cities of our State. Their experience, however, can be made use of to aid in construction, and, if on an humble scale, their improvements and advantages be guides for the future.

What is done hereafter can be done in the light of past days, and works important to the health of generations yet unborn should be done on as generous a scale as possible, and under the supervision of men of tried and acknowledged ability.

One thing is evident, the officers of our cities must make up their minds that expense is a concomitant of successful sewerage, and consideration of profit, pecuniarily, well nigh barred. Health alone can be aimed at, and minor matters set aside.

DRAINAGE.

Next to sewerage in cities, is the drainage of country districts. This returns a direct percentage on the investment, and farmers of Iowa are fast discovering the fact and rapidly deciding for themselves. They soon learn that the low lying lands on the open prairies are rich in all the constituents of crop wealth.

Draining is no longer experimental, but a regular well established business. Experienced hands go from farm to farm putting in tile drains, and the open ditch is fast becoming a thing of the past. Everywhere drain tile factories are sending out their products, and cannot keep pace with the demand. A short time ago anything, no matter how rough, was used as a drain. To-day tile are made as truly and evenly and burned as well as they were in potter's kiln, and the sale of them is reaching enormous proportions. They are made with both round and oval openings from two to eight inches in diameter and twelve inches long, costing from 30 cents to $2.50 per rod.

A trench is dug averaging four feet in depth, wide enough to lay the tile in. (There is a peculiar style of spade manufactured for this purpose, allowing just enough of dirt to be removed.) Into this ditch the tile are laid, simply abutting one another, and the ditch re-filled. The drain lasts as long as the tile remain, and every inch of the ground above it can be worked.

There are farms in Dallas county which a few years ago were dotted with unsightly ponds covering acres, homes for frogs, breeding places for mosquitoes, and prolific of fever germs. To-day, by a judicious system of drainage, these have become smooth, fine farms, and the drained land the richest of them all. The main drain is generally a large pipe, numerous small drains converging into it. The outlet forms a spring of water ample for large herd of cattle. Such an one is on the farm of John D. Whitman, Esq., in Dallas county, and suffices for his herd of thorough-breds. A neighbor of Mr. Whitman has put in this year nearly two and a half miles of tile, and reports the cost at about twenty dollars per acre for land reclaimed. But he considers it money well spent. A few crops repay all outlay; his farm can be all cultivated, and he has removed a source of nuisance which had doubtless been the main cause of the diphtheria which deprived him of one of his little ones.

Much has been done, yet much remains undone. Any physician who has a country practice in the newer districts of Iowa, knows that the well from which the water in use at the house is drawn, is only a hole three or four feet in the nearest slough or pond hole.

Water impregnated with the decaying vegetation of the rank grasses, and drainage from hog lots and barn yards, is in daily use on many a Western farm. The physician who is called to remedy the effects of this evil should urge and insist on the digging and walling of a well in some situation remote from such contamination.

Many farmers spare neither time nor expense in securing drainage for their farms. Sometimes a willful, obstinate neighbor impedes their efforts. Too lazy or indifferent to copy a good example, Mr. B. tells Mr. A. he cannot carry his drain through Mr. B's field, and in the absence of direct legislation, which in the interests of general health the Board ought to be empowered at any rate to recommend, Mr. A. is debarred from completing his work, and lives in a state of armed neutrality with his neighbor, Mr. B.[1]

If every farmer or dweller in the country would see to it that his house is built high enough above the general level of the farm, or land, to admit of drainage; stop digging a hole, without wall or drain, and dignified as a cellar, under his house, to fill up with water, rotten vegetables, and all uncleanness, breeding all the evils in Pandora's box, there would be fewer little ones, and a smaller percentage of larger ones to carry out and cover under the daisies. "The Lord giveth and the Lord taketh away," be it said in all reverence, but the hole under the house has something to do with it.

The millenium of cleanliness is only attainable by each man doing what common sense tells him he should do. No law can accomplish it. Legislation never washed a man's face, or drained his cellar. All that can be done is to point out the necessity, and urge for a constant improvement.

Some of the genial editors of Iowa are asking for what purpose is

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(1) Sections 1207-1227, Code of 1873, recite the necessary forms of procedure where open ditches, are to be cut, and properly guard by stringent rules the construction of such. But an undergrounds covered drain cannot be injurious to any one, and the permission to construct one through adjoining land, should be legally fixed, without the routine prescribed for open ditches.

the State Board of Health. Is it not sufficient if they can only act as sign posts to indicate the road to Sanitation? If one follows the designated road, another takes courage, and then another, until the contagion of example forms a nucleus around which gather all the sanitary interests of the State. Out of a multitude of counsellors some stray beams of wisdom are evoked, and time brings knowledge.

"Rome was not built in a day." The man who has lived filthy all his life will scarcely be brought to a realizing sense of his shortcomings by a single session of the Board of Health. If the labor is vain and comes to naught, probably the pay is commensurate.

DISPOSITION OF EXCRETA.

In all cities where an ample sewerage system prevails, the disposition of excreta is of course provided for as a general arrangement. Connected, however, with many dwellings in the suburbs of cities and in our towns as well as with isolated country residences, some method is adopted for the disposal of the excreta of the indwellers. In the largest majority of cases this is merely a cheap wooden privy, sometimes vaults, but more often not, and a glance at the alleys and courts of nearly all the towns of Iowa, is sufficient to substantiate this statement. The idea seems to be, it matters little what kind of, or how arranged a building, one should have for the use of the family. Anything which may serve as a temporary shelter from public observation, erected as cheaply as it is possible to construct, and probably roofless and a door with or without hinges, as it may happen. These are either set on top of the ground or mayhap a few inches of dirt are thrown out, and without wall or curb this is used for as many years as possible as a cess-pool for a dozen or more persons. Regardless of odors scarcely emanating from Araby the blest, day after day these receptacles of accumulated filth are visited by men and women, without a thought of inconsistency in comparison with the over-fastidiousness they display in all matters pertaining to personal adornment, and in affairs of social life. This is a delicate matter to call one's attention to personally, but closely connected as it is with the sanitary suggestions which rightfully come within the domain of the Board of Health, it seems appropriate to first call attention to the evil before suggesting a remedy. Not only do we find these privies in such an uncleanly state, but we also find them in our closely built towns in clusters nearly proximating one another, filling the air with unhealthy gases and impregnating all the surrounding soil with their poisonous emanations. If this were all, some method might be devised of remedy by constant attention to deodorization. But near to these sinks one may count from one to half a dozen wells which furnish the water supply of the neighboring houses. A large portion of the State of Iowa, especially all its prairie region, is a porous upper soil, from five to ten feet deep. Underlying this is the commonly called blue clay, totally impervious to water. This upper soil is in the nature of a sponge, absorbent in any direction, up or down or sideways. The accumulated debris of uncounted centuries of decayed vegetation ever untilled has formed a soil, somewhat peaty in its nature, which absorbs readily as by capillary attraction the water from the clouds and atmosphere, and in dry weather sucks up the moisture which settles down next the clay. Although the effect is to nourish vegetation and give to Iowa a soil prolific of cereal luxuriance, still the fact must be recognized that this ability of the ground to absorb moisture from any direction, should be considered when privies and wells are in such close proximity as in most of our towns.

REMEDIES SUGGESTED.

What method can be best adapted to render these receptacles of excreta most innoxious?

A few suggestions present themselves:

1. In the South it is usual to see the privy so arranged that the contents may be readily removed every day or two from the rear. In many hotels, where sewerage does not exist, large tubs are placed beneath the seats, and frequently removed and emptied, dirt having first been thrown over the contents. This method is only open to the objection of finding those who are willing to do such work, those engaged in it at the South being the colored people who have been accustomed to the work, and are insensible to its unpleasantness. Of course no vault is needed by this method. Similar systems are in use in Germany.

In Holland the vaults are emptied by means of machinery centrally situated. A vacuum is created and the contents drawn up into great tanks and manufactured into poudrette for manures. In many of our eastern towns there are doors to the vaults, especially where they can be built on a side hill, and the contents removed by men who make a business of deodorizing the excreta and mixing with dry earth and other substances. Since this is a business and constantly followed, it must be remunerative. But whether on the broad prairies of Iowa, with their almost inexhaustible fertility, such an industry would be as profitable as in the Eastern States with their numerous market gardens and stony soils, time alone can determine. The removal of human waste in this manner during the hot months would be far preferable to allowing it to accumulate so as to offend every one.

2. One system of construction, although a little expensive, yet of small cost in comparison with the added comfort and freedom from long time accumulations, suggests itself:

Wherever there is a chance of underground drainage without causing injury to others, first dig a vault four feet deep of the length and half the width of the privy, say six feet by two, then dig another of same dimensions except not exceeding two feet deep in rear of the first one, forming a pit six feet by four feet with a step; line this with brick or wood curbing, on four sides and in front of the step; then when the privy is built over it, set the same only over the deeper part of the vault, leaving the shallow pit open behind the building; from the front underside of the seat bench put in a sloping partition extending down to the front of the shallower pit; this partition should be made of narrow boards or slats, leaving openings of half an inch or so between; extend the partition the whole length of the privy; two or more ditches are then dug, somewhat lower than and leading from the lower vault, of any length, radiating like the sticks of a fan and running in any desired direction; place in these, drain tile of two or three inches in diameter, and cover them up. Have a ventilator or wood chimney, run up from the lower vault and extending above the roof of the building. The rear vault may be covered with a sloping door, which can be readily raised. In a privy so constructed, nearly all the solid matter would pass into the rear vault, and the fluid portion flow into the lower one, and be drained away. A bucket of warm water, in which a few ounces of sulphate of zinc had been dissolved, poured on the sloping partition occasionally, would keep it free and clean, and act as a disinfectant and deodorizer. The solid excreta deprived of moisture loses its unpleasant odor in a very short time, and if the bottoms of the vaults are slightly sloped in the direction of the drains, the liquid is quickly disposed of. An occasional sifting of fine dirt over the contents of the rear vault, which is easily done by raising the door, will complete the absorption, and the contents can be removed without offense. Two or three neighbors might combine in the construction of such privies, one system of drains being sufficient for all.

3. It is to be supposed that care will be taken to lead the drains sufficiently far and in a direction away from any well. For farm or country houses no better method could be devised, as there is generally some meadow or field into or beneath which the drains could be led.

In addition to these suggestions are the advertised earth closets, which are certainly desirable where there are invalids confined to the house.

CONCLUSION.

In conclusion it is only necessary to remark, that some definite series of experiments under skilled directions, is the sole way to demonstrate how to render innocuous in the shortest possible time, the waste which nature compels so constantly. Isolated experiments are confined to a limited area. The party making them does not desire to incur the necessary expense of making the result known, in order to benefit a wide circle.

Public sentiment scarcely authorizes the discussion of such a subject in a newspaper, and it is only through a Board of Health and its reports that many delicate subjects can be presented to the consideration of the citizens of Iowa. The mere thought of the fact of imperative daily demand should, however, be sufficient to impress every one with the absolute need of accomplishing the functions of nature in the most convenient way, and with due regard not only for cleanliness, but the consequent health of ourselves and those who are neighboring to us.

Local sanitary boards are in no wise justified in being mealy mouthed, or from considerations of friendship, refrain from calling any one's attention to the slovenly, dirty condition of the privy, rendering it unhealthy, a source of disease to owner and neighbor, and an eye-sore to every lover of neatness.

So accustomed have we all become from habit to these blots on the landscape, indifference has become the rule. The privies of our school houses are proverbial for their chronic uncleanness. We educate our children in costly edifices in all those studies which tend to instruct and expand the mind, not neglecting hygiene, and annihilate the theory of this last by a practical neglect of one of its most important requirements.

It is time to awake from apathy. School boards, sanitary boards, and citizens whose influence is potent in their vicinage, should not only raise their voices, but by act and deed remedy this evil. Then instead of unsightly, filthy out-houses, which one dreads even to pass, there will be erected places made respectable by care and attention, and free from the accumulation of horrors which render them so fearful now.

Respectfully submitted,

JAMES L. LORING,
Civil Engineer Iowa State Board of Health.

CORRESPONDENCE.

REPLIES OF DR. H. H. CLARK, OF M'GREGOR.

1st. *The geological formation belongs to the lower Silurian.

a. The lowest or base rock here is the *Potsdam sandstone*, a loose friable rock, at places being nothing more than loose sand.

b. Above this sandstone lies the lower *magnesian* limestone, a finely jointed rock.

c. Above the magnesian limestone is the *St. Peter's sandstone*, a rock of the consistency of the Potsdam sandstone, but as a rule somewhat harder.

d. Above the St. Peter's sandstone lies the *Trenton* group of limestones; these are also jointed, and have many layers of slaty limestone, which are impervious to water to such a degree that it gives rise to many excellent springs along the hill-sides where it crops out.

e. Above the Trenton group is the drift, which consists chiefly of sand and clay deposits. No gravel.

f. In the valleys are alluvial deposits consisting of a rich mould; clay or sand is present, according to situation.

All the rocks in this vicinity, with the exception of a few thin layers in the Trenton group and in the lower magnesian limestone, are easily traversed by water—the limestone on account of its many joints, and the sandstone on account of its being poorly cemented.

The economic value of the rocks is not great. The St. Peter's sandstone is used somewhat for making glass. This immediate vicinity furnishes sand for the Rock Island glass works. The limestone used for lime and for building purposes, with the exception of a few hard layers, is too soft for fine work.

No fossils in the magnesian rocks, nor in the sandstones. Many in the layers of the Trenton limestones.

2d. The city of McGregor is located between bluffs on the Mississippi River, extending back from the river about one and a half miles. Sewers have been constructed in all the streets, communicating with a large sewer which empties into the river. The drains from most of the dwellings empty into the sewers.

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* The figures beginning paragraphs refer to questions in circular on page 295.

3d. Proper ventilation and cleanliness about the premises.

4th. I have been a resident of McGregor ten years, during which time we have not suffered greatly from epidemic diseases, except cerebro-spinal meningitis during the winter of 1872-3, hence I can in a general way say that our sanitary condition is good.

5th. Our inhabitants obtain their drinking water and that used in cooking from cisterns. We have a few wells, averaging, perhaps, twenty-five feet in depth; drilled; they are liable to receive surface water, and the water in consequence is not generally used. We have one artesian well; depth, two hundred feet.

6th. The houses usually have cellars with stone, well ventilated, clean and free from water.

7th. Vaults—the board of health of this place see that the vaults do not become a source of filth.

8th. Conducted into the sewers by drains.

Respectfully submitted, H. H. Clark, M. D.

McGregor, Clayton county, June 7, 1880.

REPLIES OF DR. E. M. REYNOLDS, OF CENTERVILLE, IOWA.

1. The soil of Appanoose county is a brownish, clay loam, largely intermixed with clay in many localities, tempered with sand sufficiently to aid in the speedy absorption of water. The surface soil is of variable depth—on the broken lands very thin, but on the level portions or slightly rolling, which greatly predominates, the soil is uniformly deep, ranging from six to twelve inches. The substratum is nearly pure clay, called hard-pan, which holds the water for a considerable time. A great portion of the county is destitute of rock, only on the white oak lands does it crop out, and then only where the coal lies near the surface; limestone predominates.

2. Tile drainage is unknown, almost, here for any purpose. No building sites are improved by its use, much to the detriment of the health of the people by its non-use.

3. Almost everything is wanted here to make our dwellings healthful. The practice obtains here, almost universally, to build the house, where even the site is chosen, regardless of hygienic principles; no drains, no grading, sanitary rules are universally ignored; but am happy to note that the more able are now doing better in constructing their dwellings and securing drainage, especially for their cellars and basements. But those building tenement houses, or owning them, for the purpose of renting them, disregard all sanitary laws. I hope this terrible source of disease can be removed by strongest enforcement of the law.

4. I find that families living in houses with good rock foundations, floors well above the ground, with good circulation beneath, with surrounding ground sloping sufficiently to carry off surface water, are rarely attacked with malarial troubles, especially here in Centerville, as our location is a high one and generally free from malaria.

5. Three-fourths of our people, at least, obtain their water used for drinking and cooking from wells. Their average depth is probably twenty-four feet. They

are usually walled with stone, and no precaution to prevent their receiving the surface water, other than banking up for a few feet around.

6. Few houses have cellars under them, simply because they fill with water unless drained; many of our houses have cellars that stand half full of water half the year. Ventilation of cellars is sadly neglected here only in few instances, and I know of no cellar or basement that is ventilated as it should be; decaying vegetables can be found in the majority of them till late in May, usually.

7. Our privies are usually in bad condition, they are simply repositories of filth with a vault dug in the ground, usually not walled. I know of no privy that is drained.

8. The waste matter is usually thrown in the back yard.

9. In my opinion, sewerage, to make it efficient, is going to be the hardest thing to introduce on account of the necessary expense to secure it in a town like ours. We need a sewer entirely around the square, with a covered drain discharging far out of town. Sewers should be constructed along all the streets, so that every cellar in town could be drained easily, and at the same time facilitate tile draining. Surface drains should be constructed on each side of the street, protected by substantial curbstones. This expense, I am afraid, will cause a sad neglect of one of the greatest sanitary measures that claims our attention. I am glad that we have been so fortunate as to secure your valuable services in this matter.

Pardon me for sending this meager report.

I am yours, and truly,

E. M. Reynolds.

Centerville, Appanoose county, May 26, 1880.

REPLIES OF DR. C. C. PARKER, OF FAYETTE, IOWA.

I have the honor to acknowledge receipt of circular of inquiry concerning the hygienic factors in this locality and respectfully reply to your questions as well as I can briefly, in their consecutive order:

1. The soil is generally a dark, rich loam. In some neighborhoods clay preponderating; in others sand. Geologically we are on the dividing lines between the Devonian and Niagara formations of limestone; the latter being cut through and exposed at many points by our very crooked stream (the Volga) giving great diversity to the surface and much variety to the soil and subsoil.

2. In the village or city of Fayette no tile drains are used, and none are needed. To the south and westward, where the Devonian clays form the subsoil, drains are frequently needed, and occasionally tiles are used. More frequently, however, the drain is boxed with boards for a short distance from the cellar, and the remainder left as an open ditch.

3. The question is too general for a concise answer; I should say the same as in any other locality. It should be comfortable, of sufficient size, dry and well ventilated, and stand upon dry and open ground, and away from the vicinity of stagnant water (of which we have none except mill-ponds).

4. My experience is, that dwellings situated on the open prairie are much less liable to malaria and typho-malaria, than those in or about the borders of dense groves or upon the river bank. Further, my experience is that dwellings situated

upon the highest lands where the supply of drinking water is most liable to fail, are soonest affected with epidemics of specific character, such as true typhoid or enteritic fever, also epidemic dysentery; and perhaps I should also say diphtheria. The altitude in itself not being the cause of disease only so far as it increases the difficulty of securing pure water.

5. The majority of the inhabitants obtain their drinking water from wells—very many, however, from springs. The depth of wells varies greatly; in some neighborhoods from ten to twenty feet. In Fayette, twenty to eighty feet; on the hills surrounding, fifty to two hundred feet. Of the shallow wells, some are open dug wells and walled with stone; some are driven wells; some are bored and curbed, and some are bored and left without curbing. Of the deeper wells, most are drilled in the rock (usually seven-inch drill), but some are bored to more than one hundred feet and curbed either with galvanized iron tubing or with wood.

6. In Fayette, and its immediate vicinity, the houses all have cellars, walled with stone; generally ventilated, clean, and free from water. In some situations on the prairie west and northwest, cellars are wet, unless drained. Some are not walled with stone but either planked up, or are mere holes dug under the house.

7. Usually deposited in privy vaults.

8. Dishwater with kitchen garbage goes into the swill barrel and mixed with corn meal, oats or ground feed; fed to pigs or to milch cows. Soap suds is usually poured around raspberry or other garden shrubbery; sometimes upon a compost heap for manure, or into a cess-pool; sometimes, however, like the water from the common wash-basin, it is simply thrown out the back door.

9. Have no experience with sewers as to their construction. Think they should be large, with as rapid and uniform descent as possible, and empty into as rapid a stream as possible far below their origin.

Very respectfully,

C. C. PARKER.

Fayette, Fayette county, June 21, 1880.

REPLIES OF DR. A. A. NOYES, OF MASON CITY, IOWA.

1. Soil is of a clay loam, with magnesia limestone underneath all, extending for a number of miles around.

2. Every house, where there is the least danger of water in cellars, I believe every one, has proper drainage. Although we are on high ground, no town has, I think, better natural drainage in the State than ours.

3. Good ventilation for buildings, care for keeping streets and alleys clean, with care to personal cleanliness; no danger in this locality. I have been practicing here for nearly eleven years, and somewhat extensive, and have yet to see the first epidemic of any description, in this part of Iowa.

4. In this locality, I see no reason to refrain from building dwelling or business houses in close proximity to each other, and in so doing use, as I do, pure cistern water, well filtered through brick; charcoal will do. Our whole country being underlaid with limestone, makes the well water very hard, and of course unhealthy for drinking, for either man or beast.

5. Principally water from wells is used, for drinking and cooking. They are not

liable to any surface water, with any decent or proper care; they are drilled from twenty-five to fifty feet, into solid limestone rock, and this rock juts out in some places in this immediate locality. In my cellar (for instance) the rock was from three to six feet under the surface, being quite irregular in its formation all over this country.

6. Most of the cellars are in the rock, they having to be blasted out to get them, as in my own case, and walled with stone, generally well ventilated, and free from water. And one thing it may not be out of place to mention here, and that is this, notwithstanding the rock cellars, etc., I have seen some cellars during or at the termination of a heavy rain, a great deal of water in them, but in a very few houses, all nice and dry. So it will be noticed particularly, that water cannot stand in any of our cellars, but a very few hours.

7. I believe all vaults are dug to the rock, the bottoms being dry as the cellars, all excrement, also from families, being deposited in them pretty generally, I believe, and still no water in them.

8. The waste water, etc., generally thrown upon the surface of the ground, I think, and leached, or carried away.

9. Where there is no natural drainage, I think it very necessary that proper sewers should be constructed and maintained, and in conclusion—would it not be advisable to have a health officer appointed by the State Board, in every city of suitable size, to look after such things?

Respectfully submitted,

A. A. Noyes, M. D.

Mason City, June 10, 1880.

REPLIES OF L. A. MERRIAM, M. D., OF CRESCO, IOWA.

1. The soil in this section is a rich black loam, varying in depth from one to three feet, beneath which lies from four to ten feet of earth or drift, and beneath this, to the north, the lower Silurian rock which crops out in the hills and bluffs of the Upper Iowa near the north boundary of the State. To the south and west lies the upper Slurian rock which crops out along the Turkey River.

2. No tile drains are to be found in this part of the State. Drainage here is very good, due partly to the elevation of Cresco, eight hundred and thirty-six feet above Keokuk, and one thousand two hundred and eighty feet above the sea level; and also to fissures and small caves in underlying rock.

3. Nothing special is needed. Many houses in Cresco have too much shrubbery, and too many trees around and near the house, obstructing the sunlight and rendering the house damp and unhealthy.

4. Nothing.

5. All drinking water is obtained from wells of an average depth of about twenty to forty feet. This is used for cooking purposes also, and is of excellent quality, though hard water. The wells are bored into the limestone rock and are not liable to receive surface water except as it filters through the soil, for the well is tubed or curbed down to the rock.

6. Most cellars are walled with stone, and under most houses are well venti-

lated, clean, and, until this season, generally free from water. Nearly every house in town now has water in the cellar, and I have no doubt sickness will be the result.

7. Privies have all excavations to receive urinary and fœcal matter, and frequently in too close proximity to wells. Manures are carried to the fields, and barn-yards are not kept as clean always as they ought.

8. Waste water and kitchen wash are most generally poured into a great excavation which has been filled with cobble-stone, and is usually termed the slop hole. Some of these are from six to eight feet deep, and frequently too near the well. In some cases, and too frequently, the back alley receives the slops of all kinds, and refuse is allowed to accumulate to the extent of becoming a nuisance.

9. None to offer.

L. A. MERRIAM, M. D.

Cresco, Howard county, June, 1880.

REPLIES OF DR. E. H. WILBER, OF ROCKFORD, IOWA.

1. Drift formation overlying rock, drift, thin rock coming to the surface occasionally. Drift, gravel and clay, covered by sandy loam. Rock—light-gray limestone. Elevations and depressions comparatively slight. Valleys of streams not much lower than adjacent uplands, although defined in places by well-marked bluff lines and limestone ledges.

2. No tile draining.

3. Cleanliness and sunshine. Are too prone to plant groves close to and all around the buildings to the exclusion of sunlight and good air.

4. Have noticed nothing striking.

5. From wells. In valleys open and from fifteen to twenty feet deep. On uplands drilled usually from top of ground, and tubed with galvanized-iron tubing, and from thirty to eighty feet deep. Surface water well kept out.

6. Mostly have cellar, but very indifferently constructed.

7. In privies and on river banks.

8. Throw it out the back door.

9. Have not given the matter enough study to express an intelligent opinion.

E. H. WILBER.

Rockford, Floyd county, June 15, 1880.

REPLIES OF DR. W. L. M'ALLISTER, OF NEW SHARON, IOWA.

1. Soil is a deep, black loam.

2. Very little tile draining, sloughs drained by open ditches.

3. House should always be kept clean and well ventilated, from cellar to garret, and surrounding grounds constantly divested of all decaying animal and vegetable matter.

4. I have not a satisfactory answer to give.

5. From wells; average depth perhaps eighteen to twenty feet, usually walled with brick or stone, with wooden pumps; a great many receive the surface-water.

6. A large proportion of houses have cellars walled with stone or brick; some

of them are kept clean, well ventilated and are free from water; a great many are neither clean, ventilated, nor free from water.

7. A shallow vault or pit under an ordinary privy receives the animal excrement.

8. Waste water is usually thrown out at the nearest place convenient.

Yours truly, W. L. McAllister.

New Sharon, Mahaska county, June 6, 1880.

REPLIES OF DR. C. REITERMAN, OF LE GRAND, IOWA.

1. Sandy loam: limestone foundation.

2. Tile draining not practical in this vicinity.

3. Pure air, sunlight, and freedom from stagnant water, decomposing vegetable and animal matter, etc.

4. Those whose dwellings are on high, dry locations are generally healthiest. Low, marshy regions near Iowa River subject to malarious diseases.

5. Wells, average depth twenty-five feet probably, walled with stone, and generally pretty well protected against surface drainage.

6. Yes. Walled with stone; free from water; ventilated perhaps generally; imperfectly and reasonably clean.

7. Privies; with usually shallow vaults. Barn manure is usually used to enrich the soil of farms.

8. Some throw on ground, some give to hogs, etc.

Yours faithfully, C. Reiterman, M. D.

Le Grand, Marshall county, June, 1880.

REPLIES OF DR. N. L. KEAN, OF NORTHWOOD, IOWA.

1. Our town is situated on the east bank of the Shell Rock, and some thirty feet above it, at the average water mark. The town plat is nearly level, with good drainage toward the above stream. Geologically the soil formation is first a black loam from two and a half to four feet in depth; underlying that a bed of gravel from three to ten feet deep, depending upon location; following the gravel from above down we next come to a dark blue clay, about a foot in depth; then sand for some distance, followed by a deep, yellow clay of various depths.

2. There has never been any tile draining here; what draining we have is merely gutters on the road-side, built in such a way as to carry the surface water toward the stream.

4. There has not been an epidemic of any disease in this neighborhood for eight years. Last fall I had a number of cases of typhoid fever eight miles south. Every house was built on high land, but had water in the cellar and fungoid growth on cellar walls. These wells were from eight to twelve feet deep. The water in this town is obtained from wells, stoned walls, with pumps; average depth, twenty feet. They do not receive surface water unless built on low ground.

Fœcal matter and urinary matter are generally deposited in privy vaults. Waste water and kitchen wash are generally thrown into a drain carried to a large barrel sunk into the ground.

I have thus briefly attempted to answer your questions, which should receive more attention than I can at present give them. The subject is an important one, and to the Board should be given power to dissipate prevailing ignorance on those subjects, should instruct the laity, and the profession as well, concerning ventilation, drainage, sewerage, food and drinks; pointing out to them that the germs of many deadly diseases, while never produced by filth, are often transplanted to it; that they breed and flourish in it, and are decimated by it. It should be the further duty of this Board to teach that the xymotic diseases are preventable, and should be abolished, and that the continuance of these diseases should imply not ignorance alone, but criminal neglect.

Very respectfully yours,

N. L. KEAN.

Northwood, Worth county, June 10, 1880.

REPLIES OF DR. W. C. COLEMAN, OF DECORAH, IOWA.

1. Clay and sandy loam; Trenton limestone with fossils.
2. Not used.
3. Cleanliness is all that is required in the city.
4. In low places malarial fever and phthisis (tubercular); the reverse inelevated.
5. From wells mostly, and three kinds; viz.,—Drilled, average depth, 65 to 70 Excavated and walled with stone. 3d. Driven. None are much liable to receive surface water.
6. Yes. Many are not well ventilated. Few dwellings have not cellars, but one-half the store cellars are wet.
7. Common small privies. Vaults three or four feet deep.
8. Generally thrown into the alleys, which are not drained.
9. Were it not for the natural drainage; viz.,—Upper Iowa and Dry Run, our sanitary condition would be bad. This being an elevated location, were it not for the cost, deep under drains to sewers would be far preferrable.

W. F. COLEMAN, M. D.

Decorah, Winneshiek county, June, 1880.

SMALL-POX HOSPITAL.

PRINTED BY ORDER OF THE

STATE BOARD OF HEALTH.

DESCRIPTION OF PLATE I.

Fig. 1. Front elevation.

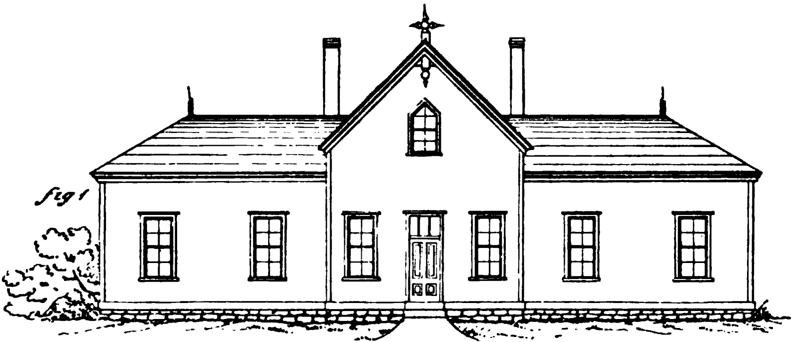
Fig. 2. Plan of main floor, with an arrangement of five or seven beds for each ward.

Fig. 3. Plan of basement.

Plate I.

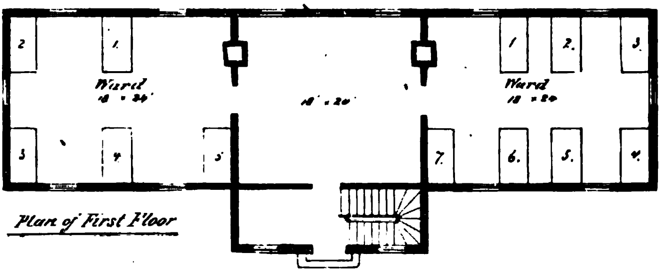
Proposed Plan for a Small-pox Hospital.

fig 1



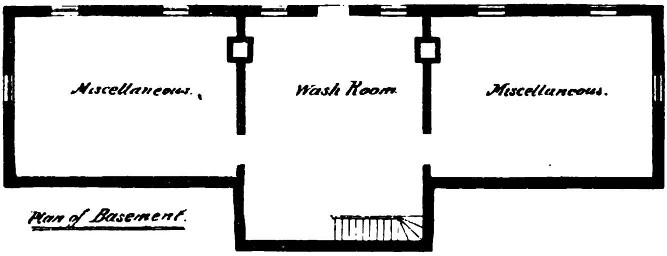
Front Elevation.

fig 2



Plan of First Floor

fig. 3.



Plan of Basement.

DESCRIPTION OF PLATE II.

Fig. 1. Rear elevation.

Fig. 2. Plan of attic room.

Fig. 3. Section (diagram) of a Galton fire-place (with blower applied), and chimney, (from Putnam's, "The open fire-place in all Ages.")

A. Duct for entrance of fresh air.

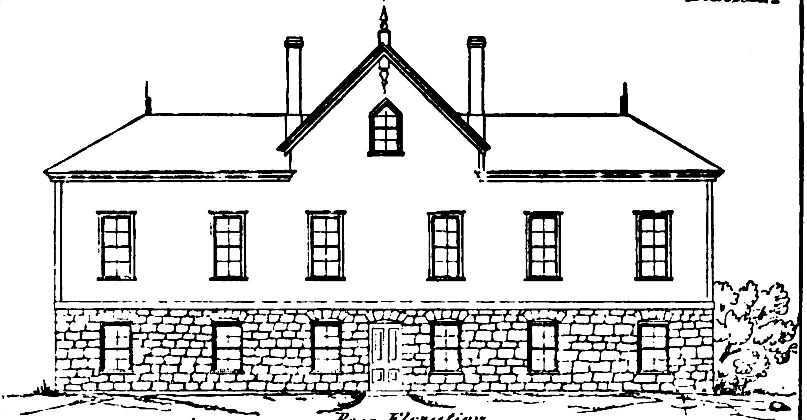
P. Iron pipe, leading from the throat of the grate to the flue above.

C. Ceiling.

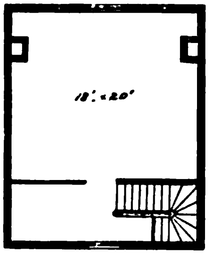
F. Space behind grate, where, and at the sides of the grate, and around the iron pipe, the air in its ascent is heated.

R. Register or opening, just beneath the ceiling, through which the heated air enters the ward.

Plate II.

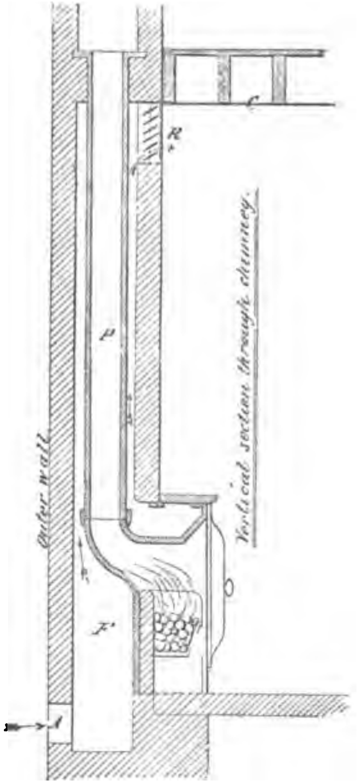


Rear Elevation.



Plan of Attic-room.

Proposed Plan for a Small-pox Hospital.



Vertical section through chimney.

SMALL-POX HOSPITALS.*

The construction and equipment of hospitals is the province of a branch of sanitary science, and of this branch I have selected a portion; viz., that of small, or as they are now commonly termed, cottage hospitals, having special reference in the treatment of the subject, to the use of these small hospitals as small-pox hospitals or pest-houses, or, avoiding those old-fashioned and apparently objectionable names, and adopting a recently recommended euphemism, hospitals for the the treatment of contagious and infectious diseases.

The origin and growth of small hospitals are exceptions to the general rule of the development of the great from the small, for the large hospitals came first and have existed for many centuries, whereas small or cottage hospitals are the product of the last three or four decades.

The great hospitals sprang from the church, and were at first and for a long time afterward devoted to the care of the old and helpless, as we would now say, asylums, and were, some of them, at least, devoted to the care of sick and wounded in comparatively modern times. Some of those enormous establishments still exist, being found in Rome, Naples and other cities of Italy.

The year 1859 saw in England, at Cranleigh, the birth of the first cottage hospital, a lapse of fifteen centuries since St. Jerome used the word "nosocomian" for an institution which must have then existed.

I will not waste the valuable time of the society by attempting to describe the various forms of cottage hospital which have been erected in Great Britain and America; nor is it deemed necessary to dwell upon the important items of site, material, etc. A few remarks may, however, be permitted on the advantages of small hospitals, and more especially of that variety of them peculiarly devoted to the treatment of contagious and infectious diseases.

The general advantages of small hospitals, beside the great one of being comparatively, if not entirely, free from the vice of hospitalism, so graphically and eloquently described by Sir J. Y. Simpson, are the following:

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*From a paper read before the State Medical Society at its annual meeting January 25, 1882, by R. J. Farquharson, M. D.

Affording as they do a home-like refuge for the poor, in cases of sickness and accident, they are not regarded with that superstitious dread, amounting almost to horror, with which all great hospitals are generally invested by the imagination of their intended inmates.

Persons treated in a well-conducted small hospital are actually surrounded with more comforts, more care and more cleanliness than are to be found in the homes of most people, for it is a lamentable fact that most private dwellings, even those of the better class, abound in unsanitary surroundings. But it is when a small hospital is used as a pest-house, *i. e.*, for the seclusion of those sick with infectious or contagious disorders, that its great excellence becomes apparent.

If every person over the age of one month was properly protected by vaccination, as they should be in every civilized community, and as they would be in the Utopian city of Hygeia, there would not be a particle of use or necessity in isolating a single case of small-pox; however this place might be advantageous in regard to scarlatina, measles, diphtheria, and perhaps other diseases.

Unfortunately, however, there are in all communities in this country a number of unprotected, or improperly protected persons for whose safety isolation of small-pox cases is necessary.

What great assistance in stamping out small-pox and kindred diseases the complete isolation afforded by a small hospital lends, is shown by the following quotations :

> No sane person doubts that the provision of adequate hospital accommodation for such cases is, in the end, by far the cheapest and most effectual course for the local authorities to adopt. Experience abundantly proves this.
>
> Dr. Buchanan has shown the value of this ready-made provision for infectious cases by recording the results of establishing a small-pox hospital at Cheltenham with fourteen beds.
>
> During six months of the year 1875, small-pox was brought into Cheltenham, no less than six times, from Gloucester, Birmingham, Liverpool and elsewhere. Seven persons ill of the imported disease were taken without delay to the hospital, and, except one individual (who was also removed to the hospital), nobody in the town caught the disease from these centers of contagion.
>
> Dr. Wilson says:—At Hastings small-pox epidemics have been twice stamped out. At Bristol, on many occasions, epidemics from various infectious diseases have been averted, and probably one of typhus in 1877.
>
> At Newcastle-on-Tyne typhoid fever (once epidemic) has several times been completely stopped.

At Leet, in Staffordshire, no case of small-pox occurred after removing the first to the hospital.

At Coventry small-pox has been stopped twice, and scarlet fever on many occasions. At Ipswich, in 1877, small-pox was imported into the borough no less than twenty (20) separate times without once getting a foothold.—*Burdett, Cottage Hospitals, 2nd ed., Phila., 1881, pp. 265 et seq.*

All this evidence comes from England, but had we such carefully prepared statistics of small hospitals in America, which unfortunately is not the case, there is little or no doubt but that it might be duplicated here.

Another and a great advantage of a ready-made small hospital for contagious diseases, is on the score of economy, and from experience, I am fully satisfied that no outlay of public money will yield a greater return in the long run. As an illustration, I may be allowed to quote the following brief chapter of my personal experience.

In 1873, the city of Davenport and Scott county were without a proper hospital for infectious and contagious diseases; upon the outbreak of the cholera, the usual senseless panic occurred, and though the epidemic only lasted a very short time, over $2,000 of public money was expended (the most of it wasted), an amount, as will be seen further on, almost sufficient to build the efficient hospital now in existence.

This brings me now to the proper subject of this paper, which is to demonstrate by example how a small hospital, especially adapted to the treatment of small-pox, cholera, scarlet fever, measles, diphtheria, or any other contagious or infectious disease (and which may be, and is, used for other purposes), may be erected upon a safe and suitable site, and for a comparatively small sum of money.

The use of the word safe, in reference to the situation of the hospital, does not refer, as it might seem at first sight, to the isolation of the building, for, in my opinion, a very slight separation from other houses is necessary, but to the protection of the hospital from destruction by fire; for, strange to say, pest-houses, although isolated from all other buildings, and not in any way peculiarly exposed to the action of the elements, are of all others, in my experience, the most liable to destruction by fire. The neighbors, not near ones, of almost every building used as a pest-house, think it no crime to apply the torch of the incendiary to the humble structure.

This had been the constant experience in Scott county, each succeeding year bringing its quota of detached cases of small-pox, the advent of each creating the ever-recurring panic, with its search for a new pest-house, and the inevitable big bill of expenditure for nurse-hire, provisions, transportation, etc., amounting in some cases to hundreds of dollars.

Tired of this state of affairs, the supervisors of Scott county and the Mayor and council of the city of Davenport, entered into a contract with the Mother Superior of the Sisters of Mercy, at Mercy Hospital, for the care and treatment of all such cases of small-pox, and other contagious diseases, as might in the future be admitted into that hospital. The agreement in brief, striking some details, was as follows; viz.,

Lease of ground for twenty-one years; city and county may renew the lease, or may remove the building, having twenty days to do so.

Compensation : Three ($3.00) dollars per day of twenty-four hours, *provided*, that when any patient shall be provided with medical attendance by second party (the Sisters), then the sum of five ($5.00) dollars per day [in addition to the said three ($3.00) dollars] shall be paid for said medical attendance. That said five ($5.00) dollars additional shall at no time be paid for more than two (2) patients at a time; but such additional sum of ———, not to exceed in any one case more than four ($4.00) dollars per day, shall cover all charges for medical attendance; and in case there is one or more such patients in said hospital, then a male nurse is to be furnished by the first party (city and county), as above stated.

Bedding, etc., to be cleaned for future use, if practicable, to be furnished by the city.

A joint appropriation of $2,500, by the supervisors of Scott county and the Mayor and council of Davenport, was then made for the building and equipment of the said hospital.

I drew the plans of the building needed, and these, after their approval by the Medical Board of Mercy Hospital, were followed in the construction.

A fine site was found, sufficiently near the main hospital for convenience of attendance and administration, and for the protection of the building against incendiarism; and sufficienty remote to afford ample protection to all parties. This site was on the declivity of a hill, but near the summit, thus affording excellent drainage, both surface and otherwise, and, as will be seen from the accompanying plates, having all the well-known advantages of a hill-side barn. After making the excavation, it was tile-drained, and a drain of broken stone put just outside of the foundation wall, on three sides; this wall is of stone (ashler), but the division walls of the basement and the chimneys are of brick.

The upper structure is of wood (frame, with tarred paper under the weather-boards), and the whole building has a total length of 70 feet, with a width of 20 feet in the wings and of 26 feet in the central portion, this projecting six feet, thus affording a hall or vestibule, which contains the stairs ascending to the attic, and those descending to the basement. These are all inside measurements.

The wings have a height to the eaves, in front of 12 feet, in the rear of 20 feet, and to the ridge (from the top of the basement wall), of 20 feet; the central part has a height to the eaves of 18 feet, and to the ridge of 29 feet (from top of basement wall). There are twenty-four windows, fourteen of which have eight (8) 14x20 panes of glass; eight (in the basement) have eight (8) 14x14 panes, and the remaining two, those of the attic, smaller ones. The fourteen windows of the main floor are all provided with weights and pullies, and, also, with inside shutters, which are not painted, but varnished.

The whole wood-work had two coats of paint, and the floors of the wards and of the central room, after being oiled, had three coats of paint.

The ground floor, which is entered from the rear by a door one or two steps above the ground, contains three rooms, two end ones of 18x24 feet, and a central one of 20x24 feet; the two former are not floored or otherwise finished, but it was intended, at some future time, to erect a bin at the end of one for the storage of dry earth, to be used in the earth-closets, with which the wards are provided; and, also, in a convenient corner, near one of the chimneys, a chamber for the disinfection of clothing by dry heat.

The central room is intended for kitchen and laundry, being supplied with water from a cistern, a pump, a sink, cooking-stove and appliances. It was floored over, but this was a mistake, the flooring should have been of concrete, which laid over a drained surface makes the best floor for such a room.

In the lower corner of the hospital lot, which is enclosed by a board fence, a small privy is built, over a vault provided with an over-flow pipe leading further down the hill, and into cultivated ground; into this vault or cesspool all the waste water is led.

As there is no other water supply than that afforded by the cistern, water-closets were out of the question; however, a very cheap and efficient substitute was found in the Wakefield earth-closet, one of which was placed in each ward.

In the attic is a room of 18x20 feet, separated from the head of the stairs by a landing. There is here sufficient lodging room for two or three attendants. On the main floor is the main room, reached by a small flight of steps from the ground level in front, through a hall or vestibule 6x20 feet. This room needs no particular description, being furnished with a table and a few chairs, and may be used as a dining, sitting or convalescent room.

Coming now to the essential part of the structure, we have two wards of 18x24x10 feet; each ward has a door leading from the central room, and five windows, with one so situated that either five or seven beds (see Plate I, Fig. 2), may be conveniently arranged. This would seem at first sight to limit the maximum capacity of the hospital to fourteen beds, but when we treat of the peculiar mode of ventilation used, it will be readily seen that at any emergency this number of beds may be safely increased.

The walls of the wards, after having been plastered and hard-finished in the usual manner, were tinted of a delicate shade of color, pleasant to the eye.

Before applying the last coat, I made a most diligent search for something to produce an impervious and glass-like surface, visiting several newly built hospitals for the purpose, but in vain. The best that can be done with such walls is to frequently scrape and whitewash them; but I am satisfied that the proper wall, especially for a small-pox ward, is one with a surface impervious as glass, which should be kept constantly moistened with a dilute solution of glycerine, thus catching all germs, debris, epithelial scales, pus corpuscles, indeed all solid particles, and preventing their rebound into the air-space of the room; at intervals, the crop of contagious particles thus gathered might be wiped off with sponges and destroyed.

The wards are heated by Galton fire-places or grates, one of which is placed at the rear end of each ward, in the division wall. Now, these fire-places will not heat the incoming air more than 30° or 40° Fahrenheit, and are, therefore, in very cold weather, to be supplemented by stoves, holes and thimbles for the pipes of which are placed in the chimneys; but for eight months of the year the heat afforded by the Galton grates would be sufficient.

Now, I may here pause to remark, one of the great beauties of this system of ventilation, which is that, no matter how close, on a cold winter night, the nurse may make every crack or crevice, where fresh air might enter, as is their wont, or how red-hot he may make the stove, the proper ventilation of the ward will proceed as long as any fire is kept up in the grate, which the attendant is always likely to have for his own greater comfort, and the increased convenience of boiling water, making tea and other drinks over an open fire. Finding (in 1876) no Galton fire-places were to be had in this country; I procured two made in Cincinnati, which answered the purpose very well; I may here remark, in passing, that Galton grates and an excellent Amercan modification of them may now be had in New York. These grates are built into the chimney (see Plate II, Fig. 3)—this is a very delicate job and requires an expert in the building of fire-places and chimneys—and are of iron, but have a lining of fire-clay. From the throat of this grate an iron pipe (see Plate II, Fig. 2 P.) rises some ten (10) feet, (just above the ceiling C), terminating in a flue, which runs the remainder of the chimney, and should terminate in a cap (but does not in the present instance).

The air, admitted from the outside at the base of structure A, is warmed by contact with the heated sides and back F of the grate, then after being still further heated by surrounding the iron pipe in its ascent, is delivered into the ward from a lowered opening or register R, placed just beneath the ceiling C. The end rooms of the ground floor being vacant and unused, the air is taken at present from them, but in case of their occupation, it would be necessary to lead a pipe outside (see Plate II, Fig. 3 A).

I have purposely left the subject of ventilation to the last, as the most important, the most essential feature, the *sine qua non* of good hospital construction.

On this subject Dr. Elisha Harris says (Public Health Reports, volume 1, page 114):

> At his side stand the masters in hygiene and surgery, and in the words of John Simon, all unite in the statement that, "So thoroughly does a hospital depend for its usefulness on the capacity of its wards for the most exquisitely perfect ventilation, that in all plans of hospital construction this is the one cardinal virtue to be insisted on. The ventilation must be such as shall leave no corner unsearched by its current."

Surgeon Billings, U. S. A., in his "Notes on Hospital Construction" (Public Health Reports, volume 2, page 386,), says of the Galton fire-place :

> If carefully made and adjusted, such a fire-place (a double one) has been found by experiment to satisfactorily heat a room of 48x25x12 feet, and to ventilate it at the rate of 40,000 cubic feet of air per hour (*i. e.*, to renew the air of such a room every twenty minutes), the external temperature being at the freezing point.

Another author says :

> The open fire-place (he is speaking of the common open fire-place, and his remarks apply with double force to the Galton, which not only removes the foul, but brings in fresh air,) sweeps the air of the room by removing 12,000 cubic feet per hour (he is speaking of a small room), every portion of which is charged with organic debris of every kind, from the inert particles of the floor, bedding and clothes, to the epithelial scales, and pus corpuscles, the carriers, it may be, of actual contagion.
>
> It is customary to speak of allowing 1,000 cubic feet of space to each patient, but if the air is renewed as contaminated by respiration and transpiration, 300 cubic feet per hour would suffice.—*Billings' Notes on Hospital Construction, Public Health Reports, vol. 2, p. 387.*

Our ward of 18x24x10 feet would give a cubic space of about 4,000 cubic feet (4,320), which, for five persons would give a cubic space of 800 cubic feet of air, and a square surface of 86 square feet to each; but, as will be seen below, the air would be renewed five (5) times per hour, or every twelve (12) minutes.

Captain Galton's estimates are as follows :

Size of the room being	6,357 cubic feet.
Air changed per hour	31,784 cubic feet.
Requiring sectional area of smoke-pipe	140 solid inches.
Requiring sectional area of cap-pipe	70 solid inches.
Requiring sectional area of fresh-air flue	400 solid inches.

Now, if these elements are preserved in the construction of the ward (and they are, excepting the chimney-cap), it would give just 20,000 cubic feet of air renewed per hour, and the cubic contents being 4,000 cubic feet, would make five times per hour, or every twelve minute, as stated.

Ridge ventilation of the wards was not attempted, and for the following reasons : In our climate it is impracticable in winter; it is always under the control of the nurse, who invariably closes it when most needed, *i. e.*, at night; and, finally, in summer it is not needed, for the end and side windows would give ample ventilation, if there was any wind blowing, and, if the air was calm, a small fire burning in the grate (with the air-duct closed) would soon renew the air.

Not having the bills at hand, I cannot state exactly what each item cost, but the total expenditure was $2,500. This included the whole outlay for the building, painting, plastering, plumbing, the purchase of a cooking stove with the necessary kitchen utensils (including a large boiler), tables, chairs, twelve iron bedsteads with beds and bedding, and, finally, the erection of two lightning-rods made of three-fourths-inch iron rods welded together (planted each in a small well reaching to the wet subsoil and filled with powdered coke) and reaching some distance above the top of each chimney.

I have thus attempted to show how a small hospital in every way adapted to the treatment of cases of small-pox, or of any other contagious or infectious disease, may be constructed at a comparatively small cost.

This plan of a small hospital is not presented as a model or typical one, but merely as a suggestion, in the hope that it may stimulate and in some degree assist in the erection of some such hospitals in various quarters of the State, where, as every one must admit, they are very greatly needed.

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FIRST BIENNIAL REPORT

OF THE

COMMISSIONERS OF PHARMACY

FOR THE

STATE OF IOWA,

WITH

ABSTRACT OF STATE PHARMACY REGISTER.

NOVEMBER, 1881.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

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1882.

IOWA COMMISSION OF PHARMACY,
OFFICE OF THE SECRETARY,
FORT MADISON, IOWA, November, 1881.

To HIS EXCELLENCY, JOHN H. GEAR, *Governor:*

SIR—I have the honor to submit to you the first biennial report of the Commissioners of Pharmacy for the State of Iowa, comprising a brief account of their transactions from the date of organization as a Board, April 23, 1880, to October 31, 1881, with an abstract of the State Pharmacy Register, to date.

Very respectfully,

GEO. H. SCHAFER,
Secretary of the State Board of Pharmacy.

REPORT.

GENERAL REMARKS ON THE PHARMACY LAW.

Before the enactment of the Pharmacy Law, the practice of pharmacy and sale of medicines and poisons was left open for all or anyone to engage in, regardless of the qualifications or disposition of individuals to sell and dispense same, indiscriminately, whether for legitimate or immoral use. The only protection, in this regard, to society was by conscientious druggists, who made it a rule unto themselves to guard the sale of dangerous drugs and poisons, and by their personal care and influence, to prevent, as much as possible, the misuse of same. This also implied that discrimination on the part of the public that would give support to such druggists. But owing largely, if not principally, to the stringency of the law relating to the sale of intoxicating liquors, the public were induced to patronize a class of druggists (so-called), who sprung into existence, in accordance with the demand. These *so-called druggists* would get up an establishment with all the paraphernalia of a handsome drug store, and then conduct their business with an eye more to the profits from the sale of liquors than drugs and medicines, using the latter only as a means of continuing their illicit traffic in liquors. The character of such an appointed drug store requiring no great amount of intelligence or skill, caused many to go into this business who were in no wise competent, but who *assumed* to supply the public, who called at these *handsome appearing* drug stores for anything required, thus endangering the lives of the people, and bringing an honorable profession, requiring great responsibility and skill, into disrepute.

With this condition of affairs, the tendency of the press and public sentiment was fast doing the legitimate druggist irreparable harm and injustice. To arrest this tendency to destroy an honorable and legitimate calling in which the Commonwealth is concerned, and to better protect the people and give an intelligent druggist *the legitimate custody* of and sale of medicines and poisons, under proper restrictions and surveillance, the legitimate druggists of the State, in convention assembled, invoked the strong arm of the law-making power and for the past year and a half have been giving the pharmacy law, enacted by the Eighteenth General Assembly, a most respectful and obedient compliance.

The Iowa State Pharmaceutical Association organized at Des Moines, February 10, 1880, now numbering near 500 members, is the representative organization for the profession of this State. The primary object was to secure a legal supervision of the dispensing of medicines and poisons both for the public and their own welfare. Their object now is to sustain the Pharmacy Law, enacted by the General Assembly, under which this legal supervision is exercised, and through their annual meetings and committees, aim to develop pharmaceutical talent, and elevate the character of the profession in this State to a standard that will warrant the legislative power to maintain and amend, if necessary, the law under which they have asked to be placed. In the President's address, at the second annual meeting he gave expression to the following sentiments:

"My first impulse is to congratulate you on the success attending your action at our first annual meeting—resulting as it has in the enactment of the Pharmacy Law of which Iowa may well feel proud.

"To the credit of her lawmakers let it be said, you did not ignore the pressing necessity of one of Iowa's business and professional interests when called upon to enact a law for the protection of an honorable calling which was threatened by existing laws and unprincipled dealers with degredation and ruin.

"You did not, as is customary with political bodies, make the business interests of your constituents a secondary matter. No: you faithfully attended to the Pharmacy bill, and passed it on its merits.

"The good effects of this measure are already foreshadowed in the respect it has attained in the courts and with the citizens who understand it and see its general observance by registered pharmacists. One year ago to-day you affected the first organization of druggists of this State by forming a State Pharmaceutical Association. Some may at first have looked upon it as an organization beneficial only to its members, but by the free dissemination of information by mailing copies of our proceedings to the press and to representative public men of the State, our Association's true objects are shown to be beneficial to the public as well as to ourselves. At our initiatory meeting it was necessary to devote our principal attention to the proposed law. This being now an accomplished fact we can take up the various other objects of the Association and by our mutual efforts encourage scientific research, develop pharmaceutical talent, correct excessive and unmercantile competition, and by our mutual good will and annual reunions obliterate any spirit of jealousy that may exist.

"It appears, therefore, more proper that I should, at this meeting, address you on the living issues of the day than recapitulate the history of our profession. It will be more to our credit to make history for our successors than to note what has been done in the past; and that we have, in the last year, written a full page, no knowing one will deny.

"To-day very few professions or classes of business men require the mental and physical training of a skilled and intelligent pharmaceutist—Americanized 'pharmacist.' This term is now generally accepted in this country as applying to one who both prepares and sells drugs and medicines, comprising the business of a druggist and the profession of a pharmaceutist, the occupation of a druggist being considered merely that of a dealer in drugs.

"While the title 'Registered Pharmacist,' as conferred by Iowa's Pharmacy Law, grants additional rights and privileges, it also requires additional responsibilities, making it incumbent on a 'registered pharmacist' to know that the quality of all drugs, chemicals and medicines sold by him are pure and unadulterated, and to know, or have good reason to believe, that all medicines, poisons, or liquors sold or dispensed by him are to be used for a legitimate purpose—while the attainment of the full measure of this responsibility from all who are registered cannot be immediately expected, owing to the necessities of the law, qualifying the right of registration by all owners of drug stores at the passage of the act, it may reasonably be expected that those who thus become 'registered pharmacists,' without the necessary experience, will hesitate to assume these new responsibilities until they become sufficiently informed to fill the law's requirements.

"By the careful performance of our duties under the law we will gradually elevate our profession and inspire increased confidence and patronage from the public, who will recognize the meritorious from the meritricious, and the penalties for violation of the law—revocation of registration—will gradually sift out those who have been a stumbling-block to our progress and disgrace to our calling.

"The most important duty of the members of this Association is to support the right and suppress the wrong-doing of our business. Conspicuous in this has been the indiscriminate sale of liquors by some so-called druggists, whose avarice leads them to sell liquors for illegitimate use.

"The Pharmacy law intrusts the 'registered pharmacists' and protects him in the legitimate sale of liquors and poisons—it effectually throws him out of the drug business if he violates the trust—it therefore becomes the duty of every 'registered pharmacist,' and every member of this Association in particular, to see that the law is enforced by filing information before a justice of the peace, or informing a prosecuting attorney of any violations; to the end that their names may be stricken from the 'State Pharmacy Register,' and they be henceforth debarred from again conducting the drug-business in this State.

"Our Committee on Legislation will likely report such measures for your consideration as they may deem proper—the prospective contest this fall in the political arena need give us no occasion for alarm, providing we do our duty as 'registered pharmacists.' Whatever our individual opinions may be on the question of true temperance reform, the adoption or rejection of the prohibition amendment will not affect our law, as it is not in conflict with the proposed amendment to the Constitution of Iowa. In Kansas, where the prohibition clause is in force, the druggists are seeking to have a law enacted to compel the purchaser to state the purpose for which he intends using the liquor, and requiring him to sign his name to a register—thus practically following our law and regulations of the Iowa Commission of Pharmacy in regard to the sale of liquors and poisons. The Illinois State Pharmaceutical Association was organized at Springfield just sixty days ago to-day, under very favorable auspices. The cause of its organization and its action are identical with our own, and we can take some pride in having given it a neighborly impetus.

"The act proposed by our Illinois brethren to the Illinois legislature, now in session, is a good commentary on our own law, and the regulations adopted by the Iowa Commission of Pharmacy in putting the same in operation. Inasmuch as they had the benefit of our experience, they incorporated some of these regulations in the act itself. For example, our law empowering the Commissioners to make by-laws and all necessary regulations for the proper fulfillment of the act—thus providing for exigencies not likely to be foreseen.

"With some additions, well worthy of your consideration, as the clause empowering the State Board of Pharmacy to grant certificates of registration without examination to licentiates of pharmacy boards of other States, if deemed worthy.

"The annual registration clause, the exemption on jury clause, and the clause for annually licensing dealers in districts distant five miles from a 'registered pharmacist' to sell household medicines. Next year it may be necessary for us to present this for future enactment, but I would recommend that if it is, it be distinctly provided that no such licensed dealer be permitted to compound medicines or prescriptions or to sell liquors or poisons.

"The bill before the Illinois legislature embodies the main principles of our law, and I hope the prestige given it in this State will aid in securing its passage by that body, thus making the passage of this law by two great States a greater influence and impetus to other States to do likewise. Indeed, the act of Iowa in passing this eminently just measure is alone carrying its influence to other States, east, west, and south.

"Many of the pioneer States of the Union are considering our law with a view to its adoption, as it confers rights and practical features in regard to the plan of examination that make a State law feasible in large States. I believe, with the exception of Maine, Kentucky, and New Jersey, Iowa is the only large State that has a State pharmacy law (now augmented by Illinois, Missouri, West Virginia, Georgia, and North Carolina). The pharmacy laws in operation in New Hampshire, Rhode Island, New York City, Kings county, New York, City of Baltimore, Philadelphia, District of Columbia, Charleston, South Carolina, Milwaukee, Cincinnati, St. Louis, and San Francisco, covering *smaller districts*, does not make it as burdensome and expensive for applicants to pass an oral examination as it otherwise would if universally required in large States.

"While we may thus flatter ourselves on the beneficence of our State pharmacy law, we should not for a moment relax our vigilance and care for the law. One year ago it was a necessity to explain its tenets to a comparatively few representative citizens. Now it is before the people as an established law, and they are to judge by its practical workings and effects whether it shall remain as an established principle of our State.

"When you meet a true temperance orator—not a fanatic, who would have temperance all his own way or not at all—explain the workings of the Pharmacy law, and if he is a true temperance reformer and a sensible man, he will see that the Pharmacy law is a true temperance reform measure, affording the people the surest remedy for suppressing the illegitimate sale of liquors in drug stores. If peradventure, he speaks of some registered pharmacist as violating the trust, tell him to urge all good and law-abiding citizens to test the virtue of the law.

"An official notice of conviction mailed to the Commission of Pharmacy will cause prompt revocation."

A direct course of procedure, since adopted and indorsed by the Attorney-general, will be found in this report in Regulation No. 3, including forms No. 30 to 33 inclusive of the "Regulations of the Commission of Pharmacy." Referring to

THE LIQUOR LAW.

The Pharmacy Law provides:

"SECTION 8. Apothecaries registered as herein provided shall have the right to keep and sell, under such restrictions as herein provided, all medicines and poisons authorized by the National American or United States dispensatory and pharmacopœa as of recognized medicinal utility: *Provided*, That nothing herein contained shall be construed so as to shield an apothecary or pharmacist who violates or in anywise abuses this trust for the legitimate and actual necessities of medicine, from the utmost rigor of the law relating to the sale of intoxicating liquors, and in addition thereto his name shall be stricken from the register."

And in section 9 it is further provided:

"Nor shall it be lawful for any licensed or registered druggist or pharmacist to retail, or sell, or give away, any alcoholic liquors or compounds as a beverage, and any violations of the provisions of this section shall make the owner or principal of said store or pharmacy liable to a fine of not less than twenty-five dollars, and not more than one hundred dollars, to be collected in the usual manner; and, in addition thereto, for repeated violations of this section, his name shall be stricken from the register."

Some contrariety of opinion exists as to the true interpretation of these provisions of the law, and the duties of the Commissioners under them. There are those who assume that it is the province of the Commissioners themselves to file information against any apothecary or pharmacist upon the mere statement of any party, either oral or by letter, that some designated person has violated the law; and consider it the duty of the Commissioners to *revoke* certificates of registration without delay and upon *ex parte* showing. We have received some urgent appeals from good and earnest people in various parts of the State offering to communicate names of witnesses by whom the offense may be proved; and previous to the adoption of regulation No. 3, course of procedure in such cases, some complaints were made because the Commissioners did not proceed to take testimony and hear and determine cases in a judicial manner and revoke the certificates of the parties complained against.

On the other hand, it has been insisted that the Commissioners have no judicial powers and no authority to revoke; and claim that the act and power of revocation of registrations belong exclusively to the courts, and is simply an additional penalty to be inflicted upon the offender upon conviction of a violation of the liquor law.

We have earnestly endeavored to perform our whole duty without fear or favor, believing that the perpetuity of the law itself, and its utility and benefits to the profession, entirely depends upon its faithful observation and enforcement, and have seriously regretted our inability in many cases to act and inquire into reported violations of its provisions. We have sought and acted upon the best legal light and information attainable; and are indebted to ex Attorney-General J. F. McJunkin, and the present Attorney-general, Smith McPherson, for many favors in this regard; and under whose advice we have been governed. Although they did not consider it strictly within the scope of their official duty to advise us, they cheerfully did so at our solicitation, and the Hon. Smith McPherson has given considerable time in meeting with us and directing our action; and the druggists of the State, in common with ourselves, are under obligations for his kindness and legal advice.

The legislature made no appropriation to assist in carrying out or enforcing the provisions of the pharmacy law; nor was it asked for by the friends of the measure. But without such aid it must readily be seen that it is not possible for the Commissioners, even if their authority is conceded to call witnesses before them and inquire into the violations of the law without some provision to pay them for their time and traveling expenses. There being no appropriation for such a purpose we were unwilling to bring parties and witnesses in some instances residing in distant parts of the State before us, and entail heavy expenses and loss of time upon parties and their witnesses. And for the same reasons it ought not to be expected that the Commissioners should quit their business and go from place to place in the State wherever they might be invited to ascertain violations of the law; as this would be at their expense. We trust this is sufficient to fully satisfy those who have entertained a different view of our duties. And a law that would impose upon the Commissioners the duty of hearing testimony, and going through the legal forms of trials would be impractical by reason of the expense and inconvenience to parties and witnesses, as much as because such a duty requires a legal knowledge that is not claimed or expected in our vocation.

Under the legal advice referred to we revoked two certificates of registration, more particularly referred to in another part of this report. In each of those cases the party had been tried, one on information before a justice of the peace, the other in the District Court, and convicted for violations of the liquor law. Certified transcripts of the trials and judgments were furnished us, with petitions asking the revocations; upon which we gave the offending parties notice, and at the expiration thereof no sufficient reasons being assigned, we considered it our duty to revoke, and to report such action to the public. These are the only cases formally presented for our interference and action.

All legitimate druggists of the State feel a common interest in the dignity of their profession, and earnestly desire to occupy a professional and business equality with that of any other profession or vocation. And all such feel the imperative necessity of ridding their business houses of the stigma of *dram shops.* The very fact that in some instances, houses called drug stores, made liquor the principal article of merchandise, brought disrepute upon the entire business and profession, and was the primary cause of the druggists' organization of Iowa, which was organized for the very purpose of ridding the drug business of an illegitimate traffic, and of placing the profession upon high grounds of intelligence and business probity. And this we could not do, otherwise than by legislative aid. And this organization has accomplished much more than we had even hoped to attain in so short a time—it has brought true and earnest druggists together from almost every county in the State, a harmonious sentiment prevails, pleasant acquaintances have been made with the fraternity all over the State, and a universal desire is manifested to enlarge our knowledge of pharmacy, and to make the profession and business respected and honorable. And all that is asked, and all the law gives, is the right to dispense liquors in accordance with the highest and universally recognized medical authorities. And any one that makes a common dram shop of his drug store is acting in violation of the law and in opposition to the business interest and honor of the druggists' profession, and it is the wish and aim of the State organization to rid ourselves of that class of houses. The law as it now stands is ample for that purpose, with the addition of an amendment declaring the mode and tribunal by which its penalties shall be enforced.

From practical observations of the pharmacy law, it is our opinion that the interest of druggists and the community at large would be better protected by local prosecutions for the violation of the law; and that a judgment of conviction be made to operate as an immediate revocation of the certificate of registration. Or else the Commissioners shall revoke the same upon being furnished with a transcript of the judgment of conviction whether the same be in a justice's court or in a court of record.

MEETING OF THE COMMISSIONERS.

DES MOINES, May 5, 1880.

In pursuance of a call from the Executive Department the Commissioners of Pharmacy, having been duly qualified, convened at Des Moines on May 5, 1880. All the Commissioners being present, they perfected an organization as a State Board of Pharmacy by electing Charles A. Weaver, Des Moines, President; Olaf M. Oleson, Fort Dodge, Vice President; George H. Schafer, Fort Madison, Secretary and Treasurer. After adopting by-laws for their government and electing a clerk to assist the Secretary in discharge of his duties, the Board took up the law section by section, discussing their duties under the law, and preparing proper forms to adopt.

MAY 6TH—MORNING SESSION.

Form No. 1, giving sixty days' notice to Register, was adopted. The following was adopted as the seal of the Commission: "Iowa Commissioners of Pharmacy. Act of 1880. Be sure you are right. Pharmacy Law."

The afternoon and night session until midnight was taken up in discussing the kind of forms needed, examining papers, etc.

MAY 7TH—MORNING SESSION.

Unfinished business of previous day continued. Pending said consideration the Commissioners met the Executive Council at the Governor's office, presenting a request for books, stationery, etc., for the use of the Board. After due consideration the Council decided they had no authority by which they could grant the request.

AFTERNOON AND NIGHT SESSION.

Form No. 2. Application for registration without examination, in accordance with section 4, adopted.

Form No. 3. Application for registration by examination, in accordance with section 5, adopted.

Form No. 4. For names and address to perfect Notification Register, adopted.

Form No. 5.. Official instructions to notary public, adopted.

MAY 8TH—MORNING SESSION.

The work of the previous day's sessions perfected as far as possible, and on motion this meeting closed, subject to call of the President whenever a conference meeting was required. It being necessary to the proper and expeditious fulfillment of the duties of the Commission to be in continuous session, the Commissioners arranged to conduct affairs by correspondence by mail and express through the office of the Secretary. In this manner they have been engaged every day attending to the duties of their office, meeting for consultation at such times and place as seemed best. The arduous and incessant labors of the Commission have thus been performed with the least possible delay, and all expenses have been borne by the Commissioners out of their fees for examination and registration. At the outset of this work the Commissioners were besieged with letters from druggists asking for instructions to guard the sale of liquors, as required by section eight. The following extract of a pithy letter is a specimen of sentiments prevailing:

"I would suggest that the Commissioners adopt some strict measures, and when they are satisfied a man is violating his trust, drop him like *a hot potato*, strike his name from the Association, and cancel his certificate. We have many men selling drugs in Iowa who care little for the legitimate drug trade. Whisky is their staple and stock in trade, and they will do much to embarrass druggists who try to run a reputable business, and I say watch everybody, and no matter who he may be, when he violates his trust, *bounce him!* The interests of the drug trade demand it, and all of us who have our reputation as men at heart demand it. If a man wants to run a saloon, we want him to take our drug sign from over his door."

Being thus assured by the fraternity at large of their disposition to at once put themselves in full accord with the letter and spirit of the law, the Commission adopted and published the following:

[Official Form No. 6.]

OPINION AND SUGGESTIONS.

In compliance with the many requests and natural inquiries of all concerned in the proper fulfillment of a Registered Pharmacist's duties under the Pharmacy Law, especially sections one (1), eight (8), and Schedule A and B of section nine (9), we submit the following suggestions and opinion according to numerous authorities, including the Attorney-general's opinion: "All Registered Pharmacists have the right to keep and sell intoxicating liquors for the actual necessities of medicine without a permit as heretofore required, so long as he properly complies with the Pharmacy Law;" and in order to facilitate and simplify your duties, we submit the accompanying form for a Poison and Liquor Book with the following injunction as a title page to said book:

POISON OR LIQUOR REGISTER.

The Commissioners of Pharmacy earnestly enjoin each "REGISTERED PHARMACIST" to so carefully and conscientiously guard the letter and spirit of the Pharmacy Law relating to the sale of LIQUORS that the most exacting persons cannot find fault with the law which reposes this trust in them of dispensing liquors for the legitimate and actual necessities of medicine. In this book we place liquors with poisons, indicating our opinion that under the broad privileges and strong penalties of the Pharmacy Law we cannot be too careful in dispensing liquors as well as poisons. Violations of this trust or the sale or gift of alcoholic liquors to be used as a beverage will cause a forfeiture of registration. It rests therefore *solely* with the *Druggists themselves to maintain this right* and redeem the drug fraternity from the odium cast upon it by the practices of illegitimate dealers who used the drug business as a cloak to sell liquors as a beverage. We would suggest that this as well as any other regulation that may be sent to "Registered Pharmacists" be kept in this book, where each "Registered Pharmacist" will have same handy and convenient for reference.

Address of the Commissioners:
CHAS. A. WEAVER, Des Moines, Iowa.
OLAF M. OLESON, Fort Dodge, Iowa.
GEO. H. SCHAFER, Fort Madison, Iowa.

CHAS. A. WEAVER,
OLAF M. OLESON,
GEO. H. SCHAFER,
} *Commissioners of Pharmacy.*

N. B.—This form of book and title page is permitted to be used by any publisher.

POISON AND LIQUOR REGISTER.

Date.	Quantity.	Name of Poison or Liquor.	PURCHASERS' REPRESENTATIONS.		PURCHASERS.		Name of Dispenser.	Remarks.
			For what purpose.	For whom.	Name or *Signature. *Require signature in all cases if practicable.	Address.		

In this manner official blank forms No. 7 to 12 inclusive, form No. 14 application for registration by graduates, were adopted, and one or more of each form required was mailed to every drug firm in the State whose name could be obtained, a record being kept of same and date of mailing, entered in Notification Register as evidence when the notice of sixty days required under section four of the law would expire.

This practical mode of publication met with such prompt response that for a period of several months the Secretary, assisted by several additional clerks, could not keep up with the correspondence and pass on the legality of applications for registration without examination as per section four—owing to necessary delay in getting lithograph certificates, all found regular were registered, the date affixed being date of their qualification under oath. All irregular applicants were promply notified and fees reported subject to order or to be applied on application for examination as per section five. Many of these sought to be registered either under a misapprehension of section four of the law, or with intent to evade same.

Simultaneous with applications for registration without examination, applications for registration, by examination, as per section five, were received before the Commission could get up the schedule of questions, and determine on the details or manner in which such examinations could be properly conducted without putting applicants to great expense of time and money to appear before the Board. As soon as a proper system of conducting written examinations *in absentia*, as contemplated by the law, could be arranged, it was done, and form number thirteen, returns for schedules of questions under oath, as per section five, relating to form number five, instructions to notaries were adopted. (These and all other forms adopted will be found in an appendix to this report.) This plan of examination as contemplated by section five of the law, however, empowered the Commissioners to demand an oral examination at such time, place and manner as they might determine. This power has been exercised in all cases of doubt, or where answers were deemed unsatisfactory, and in the few instances of notaries violating their trust, they will be reported to you for revocation of their certificate as a notary public.

On March 1, 1881, the following order was issued:

FORT MADISON, IOWA, March 1, 1881.

JOHN CONLEY, *Knoxville, Iowa.*

SIR—You are hereby informed that your rights and privileges under the laws as a Registered Pharmacist, are hereby suspended for cause shown by transcripts of the record in Justice Brodrick and Welch's Court, and that unless you furnish satisfactory evidence to our Board within ten days from date, why we should not cancel your certificate, No. 739, we will strike your name from the State Pharmacy Register and report the revocation of your certificate to the public.

GEO. H. SCHAFER,
Secretary of the Commission of Pharmacy.

On April 7, 1881, the following order was issued:

FORT MADISON, IOWA, April 7, 1881.

It is hereby ordered that the name of John Conley, Knoxville, Marion County, Iowa, be stricken from the State Pharmacy Register, and the revocation of his certificate, No. 739, reported to the public.

GEO. H. SCHAFER,
CHAS. A. WEAVER,
OLAF M. OLESON,
Commissioners of Pharmacy.

On April 22, 1881, a notice of suspension of certificate No. 1400 to I. F. Hildreth, Leon, to show cause within ten days by *written* evidence why said certificate should not be revoked.

On May 2, 1881, the Board met at Fort Madison.

Present, C. A. Weaver, R. W. Crawford, O. M. Oleson, Geo. H. Schafer.

The Secretary and Treasurer submitted their first annual reports, which, after being referred to an auditing committee consisting of C. A. Weaver and O. M. Oleson, were adopted.

SECRETARY'S REPORT.

For first year ending April 23, 1881.

Number of registered pharmacists without examination		1845
" " " by "		259
Total number of registered pharmacists to date		2104
Applicants for examination passing satisfactory examination		259
Applicants for examination suspended on first, entitled to second examination	69	
Applicants for examination rejected on second examination	4	
Applicants for examination subject to supplementary or oral examination	7	
Applicants for examination, examination papers in hands of notaries public	19	
Applicants for examination, examination papers not yet passed on	4	103
Total number form No. 3 applications for examination as per Treasurer's reports		362

Have issued five duplicate certificates at $1 each. Have issued four duplicate certificates to replace lost or mutilated certificates (without charge). Have replied to twenty-six hundred and twenty-nine letters aside from correspondence in relation to regular and irregular applications by either form. All found irregular were so notified and money reported subject to their order. Forty-two dollars of such funds still remain on hand uncalled for, with irregular applications. Many of these sought to be registered, either under a misapprehension of section 4 of the law, or with intent to evade same. Have mailed about 4000 sets of blank forms, etc. This, in brief, represents the work done the past year,

Respectfully submitted,

GEO. H. SCHAFER, *Secretary.*

FORT MADISON, Iowa, May 4, 1881.

We have made a careful examination of the books and papers in this office, and find the above report correct in every particular, all receiving our approval.

[Signed. C. A. WEAVER, } *Auditing Committee.*
O. M. OLESON, }

TREASURER'S REPORT.

Commencing April 28, 1880; ending April 23, 1881.

RECEIPTS.

362 form No. 3 applications for examination @ $5	$1810.00	
1845 form No. 2 applications without examination, @ $2	3690.00	
5 duplicate certificates @ $1	5.00	
Total receipts		$5505.00

PAYMENTS.

July 29, 1880, as per Treasurer's report, schedule A	$ 383.34	
July 29, 1880, Clerk hire for *one year!*	600.00	
Oct. 7, 1880, as per Treasurer's report, schedule B	286.65	
Dec. 31, 1880, as per Treasurer's report, schedule C	41.00	
April 23, 1881, as per Treasurer's report, schedule D	150.05	
Total expenses		$1461.04
Total net proceeds		$4043.96

Disbursed as follows:

To Commissioner C. A. Weaver	$1347.99
To Commissioner Olaf M. Oleson	1347.99
To Commissioner George H. Schafer	1347.99
	$4043.96

The above represents the whole year's transactions, as more particularly set forth in my four quarterly reports, dated July 29, 1880, October 7, 1880, December 31, 1880, and April 23, 1881, and corresponds with the Secretary's report, all of which is respectfully submitted to C. A. Weaver and Olaf. M. Oleson, Auditing Committee to review the past year's transactions.

Geo. H. Schafer, *Treasurer.*

Fort Madison, Iowa, May 4, 1881.

The undersigned, having made a thorough examination of the above and the Treasurer's books, find same correct.

C. A. Weaver, }
O. M. Oleson, } *Auditing Committee.*

The new Board was then organized by the election of R. W. Crawford, President; C. A. Weaver, Vice President; George H. Schafer, Secretary and Treasurer.

The following resolution was adopted:

"Whereas, Mr. Olaf M. Oleson the retiring member of this Board has ably, faithfully and fearlessly performed his duties as Commissioner of Pharmacy; and,

"Whereas, We recognize that his services has materially aided and promoted the welfare and elevation of our profession to its proper plane within our State; therefore,

"*Be it resolved*, That we tender him our sincere thanks for his zeal and co-operation with others in the pharmacy work."

I. N. Hildreth, Leon, appeared with attorneys in answer, showing case in which notice of suspension issued April 22d was based had been appealed. On this the Board ordered the secretary to notify I. F. Hildreth of the extension of his suspension to June 15, 1881, and if no satisfactory evidence was submitted within this time to controvert the evidence on file his certificate number 1400 be revoked and his name stricken from the register.

May 3, 1881, the Commissioners were served by the attorneys of I. F. Hildreth with a notice of application for a writ of injunction before Judge Stutsman on the following day.

May 4, 1881, R. W. Crawford and George H. Schafer appeared before Judge Stutsman and asked for one week's time until they could have counsel of the Attorney-general. This being refused, and the next day set for trial, the Board under the advice of the District Prosecuting Attorney, ordered the Secretary to send I. F. Hildreth a copy of the following order:

FORT MADISON, IOWA, May 4, 1881.

I. F. HILDRETH; *Leon, Iowa*:

You are hereby notified that the action of the Commissioners of Pharmacy for the State of Iowa suspending your rights and privileges as a registered pharmacist made on March 26, 1881, and notice issued on April 22, 1881, and May 2, 1881, is hereby rescinded and set aside. The time given for trial on the petition for injunction being deemed insufficient, certificate number 1400 is in full force and effect. By order of the Commission of Pharmacy.

GEO. H. SCHAFER,
Secretary of the Commission of Pharmacy.

The following covers the record in this case to date:

PROCEEDINGS OF THE IOWA STATE COMMISSION OF PHARMACY.

DES MOINES, October 13, 1881.

Whereas, it appeared by a duly certified copy of the records of the District Court of Decatur county, in the State of Iowa, in the case of the *State of Iowa v. Isaac F. Hildreth*, that the said Isaac F. Hildreth, had at the January, 1881, term of said court been indicted by the grand jury of said county for a violation of the law regulating the sale of intoxicating liquors; and, whereas, it further appeared from said record (which has been filed with the commissioners and marked exhibit "A") that the said Isaac F. Hildreth had, at the May term, 1881, of said court, been duly tried and convicted of said of, fense, notice in writing was, on the 17th day of September, 1881- served on said Hildreth, informing him of the foregoing facts and directing him to appear before the commissioners in session at Des Moines, Iowa, on the 13th day of October, 1881, to show cause, if any, why his name should not be stricken from the list of registered pharmacists, and his certificate of registration revoked.

Thereafter, on the 13th day of October, 1881, the Commissioners met in session at Des Moines, Iowa, and the said Hildreth appeared in person and by attorneys, and filed a protest against the jurisdiction of the Board, which was overruled; the said Hildreth then filed an answer and application for time to procure testimony, but the Commissioners being of opinion that sufficient time had been given already by the notice, and that no good reasons appeared for extending the time further, refused the application. The said Hildreth after examination of the certified record of the proceedings in the case of the State of Iowa against him as defendant, filed objection thereto that the same was insufficient and incompetent as evidence for the Commissioners to act upon, which objection was overruled. No testimony was introduced or offered to be introduced by said Hildreth on his own behalf. Thereupon the Commissioners took the matter under advisement, and upon due consideration find the fact to be that said Hildreth has been by the District Court of Decatur county, in the State of Iowa, at the terms before stated, duly indicted, tried, and convicted of the crime of nuisance, for that on the 1st day of July, 1880, and daily thereafter, in Decatur county, Iowa, up to the time of finding the indictment against him, he did unlawfully keep, own, control, continue, establish, and manage a building in Leon, Iowa, for the purpose and intent of keeping and selling therein, in the State of Iowa, intoxicating liquors in violation of law, and at the said time and place, and in said building, did keep and sell in the State of Iowa, intoxicating liquors in violation of law; and that said judgment of conviction is a final judgment against the said Hildreth; the Commissioners further find that no good or sufficient reason has been shown why the name of the said Hildreth should not therefore be stricken from the list of registered pharmacists of the State of Iowa and his certificate of registration revoked. The Commissioners therefore order and direct the Secretary to strike the name of said Issac F. Hildreth from the State Pharmacy Register, and that certificate No. 1400, heretofore issued to said Isaac F. Hildreth as an assistant pharmacist, be and the same is hereby revoked.

By order of

R. W. Crawford,
C. A. Weaver,
Geo. H. Schafer,
Commissioners of Pharmacy.

Attest: Geo. H. Schafer, *Secretary.*

TREASURER'S REPORT.

To Commissioners of Pharmacy, commencing April 23, 1881, ending Oct. 31, '81.

RECEIPTS.

169 Form No. 3, Applications per examination at $5	$ 845.00	
12 Form No. 2, Applications (received before May 28, 1881) without examination at $2	24.00	
4 Duplicate certificates at $1	4.00	
4 Form No. 14, Applications of Graduates at $2	8.00	
For printed matter	5.00	
		$ 886.00

PAYMENTS.

1881.		
July 30, Expenses as per Treasurer's quarterly report	$ 167.04	
Oct. 31, Expenses as per Treasurer's quarterly report	148.08	
Total expenses		$ 315.12
Total net proceeds		$ 570.88

Disbursed as follows:

To Commissioner C. A. Weaver	$ 190.29	
To Commissioner R. W. Crawford	190.29	
To Commissioner Geo. H. Schafer	190.29	
		$ 570.88

Respectfully submitted,

Geo. H. Schafer, *Treasurer.*

SECRETARY'S REPORT.

To Commission of Pharmacy, including first year and complete to Oct. 31, 1881:

Pharmacists registered as owners	1,341	
Pharmacists registered as principals	95	
Pharmacists registered as assistants	408	
Pharmacists registered as graduates	17	
Number of registered Pharmacists without examination		1,861
Number of registered Pharmacists by examination		380
Total number of registered Pharmacists to date		2,241

Eighteen lady pharmacists being in the number registered.

APPLICANTS FOR EXAMINATION.

Passed on first examination	345	
Passed on second or re-examination	35	
Total passed on examination		380
Suspended on first examination, entitled to re-examination	58	
Suspended on first examination, lapsed or rejected on 2d examination	54	
Irregular and lapsed on first examination	9	
Awaiting supplementary or oral examination	2	
Examination papers in hands of notaries	8	
Examination papers not passed on by Commissioners	20	
		151
Total number applications for examination per Treasurer's report.		531

Have issued nine duplicate certificates at $1 each; have issued four duplicate certificates to replace lost or mutilated certificates (without charge). Have replied to thirty-five hundred and fifty-three letters, aside from correspondence relating to regular and irregular applications by either form. Still have $22 on hand, which was reported to irregular applicants as subject to their order.

The following certificates have been revoked:

No. 739, John Conley, Knoxville, registered June 26, 1880, as an owner; No. 1,400, Isaac F. Hildreth, Leon, registered July 13, 1880, as an assistant.

Respectfully submitted,
GEO. H. SCHAFER, *Secretary.*

AMENDMENTS.

The amendments previously suggested are:

1. To have the power and duties of the Commissioners more clearly defined on violations of the law and revocation of certificates.

2. To provide for the payment of all fees and and license to the Auditor of State for the State treasury. To specially provide that the annual license from itinerant venders as per section 10 be paid to the Auditor of State. Under the present wording of this section this license has been paid by some to the State Auditor, and by others to county auditors, thus rendering its collection less efficient and making it impracticable for this Board to report amounts collected.

3. To provide for an appropriation for the Commission to execute this law and for protecting the records and papers filed as evidence and basis for registration.

4. To more clearly define section 12 so that the exception clause does not apply to section 10 referring to itinerant venders.

CONCLUDING REMARKS.

While it is conceded a new law of any kind requires time and considerate amendments to have it approximate to a perfect law, the Commissioners respectfully ask a critical review of the results so far attained by the limited provisions and without expense to the State, and are duly encouraged in their labors by the favorable reports of the good done by the Pharmacy Law. Eminent jurists and citizens commenting on the active support given this law, say it is a live law, that has the spirit of progress stamped on its every day observance and enforcement. In quoting this praise for Iowa's Pharmacy Law it should not be considered that the former lamentable condition of pharmacy in this State is an exception to the rule in other States, for it is not; as is evidenced by the enactment and efforts to enact similar laws in nearly all the States. Our Board was represented at the first conference meeting of the Pharmacy Boards of the United States and Canada, at Saratoga, N. Y., on September 14, 1880; also at the second meeting in Kansas City, Missouri, September 23, 1881, the principal objects then being to promote the successful operation of pharmacy laws by securing a universal standard for examinations, and by all means in their power to further the objects of pharmaceutical legislation. The motto on the seal of the Iowa Commissioners of Pharmacy, "BE SURE YOU ARE RIGHT", is a good watchword for all registered pharmacists in dispensing medicines, liquors, and poisons, and we believe they have accepted and are acting on this maxim in good faith. On this principle the Commissioners have and will no doubt continue to act.

All of which with the regulations and forms subjoined is respectfully submitted to your Excellency and thus indirectly to the legislature and the citizens of Iowa.

Very respectfully,
GEO. H. SCHAFER, *Secretary.*

By order of

C. A. WEAVER,
R. W. CRAWFORD,
GEO. H. SCHAFER,
Commissioners of Pharmacy.

REGULATIONS.

GENERAL REGULATIONS AUTHORIZED BY SECTION 3, CHAPTER 75, ACTS OF THE EIGHTEENTH GENERAL ASSEMBLY.

Regulation No. 1.

Druggists and pharmacists who were registered *without examination* by virtue of having been engaged in the drug business as *owners* or *principals* at the passage of the Pharmacy Law, forfeit their registration when they have sold, parted with or severed their connection with the drug business at the place designated in certificate of registration, thus disposing of their constitutional rights conserved by the law.

Should such party, who has thus forfeited his registration, wish to re-engage in the practice of pharmacy he will be required to be registered by examination as per section 5.

Adopted June 4, 1881.

R. W. CRAWFORD,
GEO. H. SCHAFER,
C. A. WEAVER,
Commissioners of Pharmacy.

I see no objection to above and therefore indorse it.

June 16, 1881. SMITH MCPHERSON, *Attorney-general.*

Regulation No. 2.

Redress must be sought through the courts for violations of Pharmacy Law in conducting a drug-store or pharmacy without registration or for violations by the sale of "poisons" enumerated in schedule "A" and "B," section nine (9), chapter 75, or for any other violation of the law, except the revocal of certificates of registration, the Commissioners of Pharmacy exercising judicial powers only in cases of violations of law requiring revocals of certificates of registration, for which ee forms Nos. 30, 31, 32, and 33.

Adopted June 4, 1881.

GEO. H. SCHAFER,
R. W. CRAWFORD,
C. A. WEAVER,
Commissioners of Pharmacy.

Indorsed.

SMITH MCPHERSON, *Attorney-general.*

Regulation No. 3.
Form No. 30.

For the purpose of determining when certificates of registration should be revoked and the name stricken from the State Pharmacy Register, the Commissioners of Pharmacy for the State of Iowa have adopted the following

REGULATIONS.

That in the trial of complaints asking the revocation of certificates for a violation of the Pharmacy Law, the following rules should govern: A complaint in writing, duly verified, charging the accused in plain and concise language, or a certified copy of an indictment or information filed in any court in this State, should be filed with the Secretary of this Board, whereupon the President of this Board shall issue a commission to some person authorized to administer oaths, directing him to fix a day for taking the testimony of both parties, the accuser and the accused, which commissioner shall give said parties notice of the time and place of taking such proofs; which commissioner shall also determine what evidence he will receive: when so taken shall reduce to writing and mail to the Secretary of this Board. The accuser and accused may submit to this Board arguments in writing or print, on or before a day to be fixed by the President of the Board. Said parties to have notice by letter of said day, after which said evidence shall be examined by the Board and judgment of the Board rendered, provided, the judgment, or certified copy thereof, showing a conviction on informations or indictment for violations of the law, or for selling liquors and poisons contrary to law, shall be conclusive evidence against the accused, and his certificate shall be forfeited and revoked as prescribed in the sections of the law violated.

Form No. 31.

....Iowa.

To Geo. H. Schafer, Fort Madison, Iowa, Secretary of the Commissioners of Pharmacy for the State of Iowa:

Sir—The undersigned, being empowered by law to administer oaths, hereby consents to serve as a commissioner to take and report to the Commission of Pharmacy any evidence for or against any registered pharmacist on any information filed under oath for violations of the Pharmacy Law, and I hereby agree to conduct said proceedings without expense to the Commission of Pharmacy.

....

Form No. 32.

Secretary's Office,
Commission of Pharmacy for the State of Iowa,

To........................for.... ....Iowa:

Information under oath having been filed in this office, charging..............., a registered pharmacist, of.................., Iowa, with having violated the provision of the Pharmacy Law, chapter 75 of the acts of the Eighteenth General Assembly, you are hereby appointed a commissioner to hear and report the evidence in the matter, both for and against the accused. The written information filed is hereto attached, which will be your guide in taking said evidence.

You will notify the accused and accuser of the time and place, when and where, you will hear the evidence, and when completed, you will return information with the written or printed evidence and arguments to Geo. H. Schafer, Secretary, Fort Madison, Iowa.

Give the plaintiff and defendant not less than ten days' notice of hearing.

The returns to be made within thirty days from date hereof.

If the defendant fails to appear, enter default, and return papers forthwith.

…………………, Secretary. ………………President.

Form No. 33.

SECRETARY'S OFFICE,
COMMISSION OF PHARMACY FOR THE STATE OF IOWA,
FT. MADISON, Iowa, ……..188 .

……………*Registered Pharmacist of*……………, *Iowa:*

SIR—Complaint under oath has been filed in this office, charging you with violation of the provisions of the Pharmacy Law, chapter 75,'acts of the Eighteenth General Assembly, under which you hold certificate No…………Mr………… of…….. ……., Iowa, has been appointed a commissioner to take and report to the Commission of Pharmacy the evidence for and against you. You will, therfore, appear before said commissioner at such time and place as he shall notify you, and make your defense to the charge against you. By order of the Commissioners of Pharmacy.

…………………. Secretary.

Regulation No. 3, including forms Nos. 30 to 33 inclusive.

Adopted June 4, 1881.

C. A. WEAVER,
GEO. H. SCHAFER,
R. W. CRAWFORD,
Commissioners of Pharmacy.

I have examined forms Nos. 30 to 33 inclusive, providing for a procedure for hearing complaints asking the revocation of certificates and would say, in my opinion, they will enable the accuser and accused both to have a full and fair hearing. As to their legality they are all right.

SMITH MCPHERSON, *Attorney-general.*

June 16, 1881.

Regulation No. 4.

A *registered pharmacist*'s certificate of registration is required to be conspicuously posted in place of business as evidence to the public who are and who are not authorized by law to conduct the drug business.

Adopted May 7, 1880.

Approved June 24, 1881.

GEO. H. SCHAFER,
R. W. CRAWFORD,
C. A. WEAVER,
Commissioners of Pharmacy.

Regulation No. 5.

The sale of paris green (i. e. arsenic and its preparations), being one of the poisons included in schedule A, section 9, of chapter 75, of the acts of the Eighteenth General Assembly, should be entered in the Poison Register. It is, therefore, unlawful for any person except a registered pharmacist to retail the same for any purpose whatever.

Adopted June 4, 1881.

GEO. H. SCHAFER,
R. W. CRAWFORD,
C. A. WEAVER,
Commissioners of Pharmacy

Regulation No. 6.

The sale of Homeopathic medicines (not proprietary), properly come under the regulation of the Pharmacy Law. The sale, therefore, of any quantity of arsenic, aconite, nux vomica, belladona, and other poisonous preparations enumerated in schedule A or B, section 9, should be sold as therein required. A technical construction is warranted in the sale (except as provided in section 9), of a single bottle of these remedies, notwithstanding the contents of an entire bottle proved harmless, as the purchase and use of several bottles of same might prove fatal.

GEO. H. SCHAFER,
R. W. CRAWFORD,
C. A. WEAVER,
Commissioners of Pharmacy.

UN-OFFICIAL OPINION NO. 1.

To the question does section 12, referring to proprietary medicines, nullify Sec. 10? Would say that we do not think it does. Section 10 refers to an *itinerant vender* of any drug, nostrum, appliance, etc., proprietary or any other kind. Section 12 refers to the sale of proprietary medicines, from any established place of business, not proprietary medicines of an *itinerant.* A hog cholera medicine would come under section 10, the same as any other medicine *if sold in itinerancy*, but if it is put up in a regular style and properly labeled by proprietors as from an established place of business, it would come under section 12.

GEO. H. SCHAFER.
R. W. CRAWFORD.
C. A. WEAVER.

UN-OFFICIAL OPINION NO. 2.

To the question:

Do you understand that we are prohibited from selling intoxicating liquors where we know it is to be used for mechanical, culinary or sacramental purposes? We would answer yes; but look forward to such general observance of privilege to sell as a medicine as sometime to warrant the people, through their lawmakers, to extend this privilege, under proper restrictions, so as to cover its sale for purposes above indicated. This can only follow when registered pharmacists have found themselves, as a class, worthy of being custodians of liquor for use as a medicine.

See Secs. 8 and 9 of the law.

C. A. Weaver.
Geo. H. Schafer.
R. W. Crawford.

Form No. 1.

NOTICE.

Office of the Secretary and Treasurer,
Commission of Pharmacy for Iowa,
Fort Madison, Iowa, ..., 188 .

To................................,
............................., Iowa.

In compliance with chapter 75, acts of the Eighteenth General Assembly, being an act entitled "An act to regulate the practice of pharmacy and the sale of medicines and poisons," approved March 22d, 1880, the Commissioners appointed under authority of said act herewith enclose you a copy of this law, and hereby *notify you and all persons in your employ*, who come under the requirements of said law, to make application for registration in conformity therewith.

We submit form No. 2, being blank application for registration, without examination, in accordance with section 4: also form No. 3, being blank application for registration, by examination, as per section 5.

Anyone entitled to registration under section 4, may prefer, and has the privilege, of ma king application for a certificate by examination, in accordance with section 5 The Commission will issue two different designs of certificates, the one under section 4 having a green seal, simply designating the party as a registered pharmacist, the other a more elaborate certificate with gold seal, stating the party qualified as a registered pharmacist by examination, in accordance with section 5, and in addition thereto, enabling the Commissioners to certify to the party being a competent pharmacist, and fully qualified to conduct the business of compounding or dispensing drugs, medicines or chemicals for medicinal use, or to compound physicians' prescriptions. The examination under this section will first be conducted either by submitting a schedule of questions to be answered under oath before any regularly qualified notary public of your county, whom you may designate, and to whom said questions will be mailed, with instructions, on receiving your application as per form No. 3, or orally before either of the Commissioners, subject, however, to the approval of a majority of the Board. Oral examinations will not be required unless the Board are dissatisfied with the answers, when due notice will be given of time and place when the applicant may present himself for said examination.

Should any person who is entitled to register under section 4, but who applies for registration by examination under section 5, fail to pass a satisfactory examination he may still become registered under section 4, by making another application as per form No. 2, and also retain his privilege for re-examination, as per section 6.

In addition to the above we call your special attention to sections 1, 2, and 11, and trust to the intelligence and active interest of druggists in all sections of the State to see that each section of the Pharmacy Law is enforced.

Respectfully,

CHAS. A. WEAVER,
OLAF M. OLESON,
GEO. H. SCHAFER,
Commissioners of Pharmacy.

Address all communications for the Secretary and Treasurer of the Commission, to
GEO. H. SCHAFER, *Commissioner of Pharmacy,*
Fort Madison, Iowa.

(Extra forms, i. e. one for each individual name, will be sent on application.)

Form No. 2.

APPLICATION FOR REGISTRATION WITHOUT EXAMINATION; IN ACCORDANCE WITH SECTION 4, CHAPTER 75, ACTS OE THE 18TH GENERAL ASSEMBLY.

To the Commissioners of Pharmacy for the State of Iowa:

I, ..., having been engaged in the drug business in.................... (town or city), county of.......................... and State of Iowa, at the time of the passage of an act entitled: "An act to regulate the practice of pharmacy and the sale of medicines and poisons," approved March 22, 1880, hereby apply for Certificate of Registration, under the provisions of said act, and submit the following evidence as to qualifications; and herewith enclose draft (or post-office money order) for the sum of two dollars ($2), payable to the order of Geo. H. Schafer, Fort Madison, Iowa (the Secretary and Treasurer's office), to whom this application is mailed on the ....day of............., 188.., which is within 60 days from receipt of first notice.

Question No. 1. What is your name in full and present place of residence?

Answer No. 1...

Question No. 2. State if you were owner or principal on March 22d, 1880, and state present place of business, and No. of street.

Answer No. 2...

Question No. 3. (If an assistant) give name of employer and location of store.

Answer No. 3...

Question No. 4. Were you engaged in the business as pharmacist or druggist, selling, compounding or dispensing drugs, medicines or chemicals for medicinal use or for compounding and dispensing physicians' prescriptions, either as owner, principal, or assistant, in the State of Iowa, on March 22d, 1880?—the date of the passage of "an act to regulate the practice of pharmacy and the sale of medicines and poisons."

Answer No. 4. * Yes, I was as...

Question No. 5. How long have you been in the drug business?

Answer No. 5...

Question No. 6. What is your age?

Answer No. 6...

Question No. 7. (If an assistant) were you engaged three years or more prior to the passage of this act in some drug store or pharmacy where physicians' prescriptions were compounded and dispensed?

Answer No. 7...

STATE OF IOWA, }
....County, } ss.

I, ..., the applicant in the foregoing instrument, being duly sworn, depose and say that the statement and answers therein are true as I verily believe.

(Sign here.)....... ....

Sworn to before me, and subscribed in my presence by the said ....on this.... ....day of

[SEAL.] ....A. D. 188 . Witness my hand and seal notarial hereunto.

............................*Notary Public.*

Additional forms, i. e. one for each individual name, will be sent on application.

* N. B.—If you cannot answer question No. 4 in the affirmative you should apply per form No. 3, i. e. by examination.

Do not erase any of the above printing. If you cannot make statement in exact accordance with this form, you should apply per form No. 3, i. e. by examination for certificate of competency. This will be of additional value to you as a registered pharmacist.

Form No. 3.

APPLICATION FOR REGISTRATION BY EXAMINATION; IN ACCORDANCE WITH SECTION 5, CHAPTER 75, ACTS OF THE 18TH GENERAL ASSEMBLY.

To the Commissioners of Pharmacy for the State of Iowa:

I, ..., of.........................., county of ...., State of Iowa, hereby apply for registration and certificate as a "registered pharmacist," by examination, in accordance with section 5 of the Pharmacy Law, approved March 22d, 1880.

If I pass a satisfactory examination, I desire my certificate made out for........ ....(town or city), county of..................., State of Iowa.

I am.....years of age, and have been engaged in the drug business.....years, and request that a schedule of questions * be sent to.............................. (post-office address)....................Iowa, a regularly qualified notary public in and for.................... county, State of Iowa, and herewith enclose draft (or post-office money order) for the sum of five dollars ($5), payable to the order of Geo. H. Schafer, Fort Madison, Iowa (the Secretary and Treasurer's office), to whom this application is mailed, on the........, day of.............., 188 .

I submit the following evidence of sober habits and good moral character:

Name of applicant...................................

We the undersigned, citizens of ...., hereby certify to the sober habits and good moral character of the above applicant, having known said applicant for.......years.

We also certify to the good moral character and *trustworthiness* of the officer designated to receive the schedule of questions herein referred to.

[Recommendations from druggists and physicians are preferred, as being most likely to be known to the Board.]

....
....
....

I hereby accept the above appointment and will faithfully follow the instructions of the Commission of Pharmacy.

[SEAL.] ....*..........................Notary Public
in and for....................county, Iowa.

*NOTE.—This plan of examination is to save traveling and hotel expenses to the applicant. If, however, the Board deem answers unsatisfactory, they can and will demand oral examinations, at such time and place as they may designate. [If applicant prefers, he can answer schedule of questions before either one of the Commissioners, instead of a notary public.]

N. B.—Section 4 of the law requires every person who fails or neglects to apply for registration within 60 days after being notified, to undergo an examination as provided for in section 5. The last and final notice to all, dated March 28th, 1881, was published in "Iowa State Register," and "Iowa State Leader," at Des Moines, Iowa; the object of the law being ultimately to restrict the practice of pharmacy to properly qualified pharmacists.

Registration without examination expired May 28, 1881.

Form No. 4.

The Commissioners of Pharmacy respectfully request you to furnish a list of names of all parties in your locality, as per the following blank, who properly come under the requirements of the Pharmacy Law, in order that they may perfect their Notification Register, and thus more completely fulfill their duties under said law.

NAMES.	ADDRESS.
....	....
....	....

Form No. 5.

See chapter 75, acts Eighteenth General Assembly.

OFFICIAL INSTRUCTIONS TO THE NOTARY PUBLIC.

To............................, Notary Public:

..........................., Iowa.

DEAR SIR—You have been designated by Mr.... ...., of .... (whom you will notify of receipt of papers and who will pay your fee), to receive the enclosed schedule of questions *which you will protect and retain* in this sealed envelope until said applicant appears for examination, when you will break the seal, read form No. 13, and instructions at head of schedule of questions, and hand same with schedule of questions to the aforesaid, informing him he has five hours' time to complete his replies, which must be done in your presence.

The answers to questions are to be written in numerical order, as per instructions on schedule, on separate sheets of paper, each sheet to bear the signature of the applicant. If applicant waives examination, have form 13 executed, and returned promptly and in every case make returns within 30 days from receipt of papers. As soon as the papers are completed, seal and return same to

GEO. H. SCHAFER, Fort Madison, Iowa.
C. A. WEAVER,
R. W. CRAWFORD,
GEO. H. SCHAFER,
Commissioners of Pharmacy for the State of Iowa.

Form No. 13.

SWORN STATEMENT OF APPLICANT BY EXAMINATION.

I, ..., of.................. ....(town or city), Iowa, am ....years of age, have had........years' experience is the drug business, and hereto attach a schedule of questions submitted to me this..........day of......., A. D. 188 , through...... .....notary public, with my answers thereto duly signed, which I declare were made in said notary's presence within five hours' time, and without inter-communication or aid from books or other sources after said examination commenced. And I further declare I have not examined said schedule of questions previous to this examination, and will not disclose same.

STATE OF IOWA, }
..............County. } ss.

I, ..., the applicant, being duly sworn, depose and say that the above statement is true as I verily believe.

....

Sworn to before me and subscribed in my presence by the said................
............on this........day of.............A. D. 188 .

[SEAL.] Witness my hand and seal notarial hereunto.
....Notary Public
in and for.................county, Iowa.

I hereby certify that the schedule of questions received by me from the "Commissioners of Pharmacy for the State of Iowa," have been properly submitted to the above named applicant as per official instructions Form No. 5, and that said schedule of questions are herewith returned without having been shown to anyone but the aforesaid applicant.

Witness my hand and official seal hereunto this........day of............188 .

[SEAL.] ....Notary Public
in and for............. .....county, Iowa.

Form No. 14.

APPLICATION FOR REGISTRATION WITHOUT EXAMINATION AS A GRADUATE OF A COLLEGE OF PHARMACY THAT REQUIRES FOUR YEARS OF PRACTICAL EXPERIENCE BEFORE GRANTING A DIPLOMA IN ACCORDANCE WITH SECTION 5, CHAPTER 75, ACTS OF THE 18TH GENERAL ASSEMBLY.

To the Commissioners of Pharmacy for the State of Iowa:

I,............................of (town or city)........................ ....., county of .... and State of Iowa, hereby apply for certificate and registration, under the provisions of "an act to regulate the practice of pharmacy and the sale of medicines and poisons," approved March 22, 1880, and submit the following evidence as to qualification; and herewith enclose draft (or P. O. money order) for the sum of two dollars ($2), payable to the order of George H. Schafer, Fort Madison, Iowa (the Secretary and Treasurer's office), to whom this application is mailed on the ....day of................188 .

Question No. 1. What is your name in full and place of residence?

Answer No. 1. ....

Question No. 2. Where is your place of business and No. of street?

Answer No. 2. ....

Question No. 3. (If an employe) give name of employer and location of store.

Answer No. 3. ....

Question No. 4. Are you a graduate of a college of pharmacy that requires four years' practical experience before granting a diploma?

Answer No. 4. ....

Question No. 5. What is the name of the college of pharmacy at which you graduated?

Answer No. 5. ....

Question No. 6. What is the number and date of your diploma?

Answer No. 6. ....

STATE OF IOWA, }
...........County. } ss.

I,........................., the applicant in the foregoing instrument, being duly sworn, depose and say that the statement and answers therein are true as I verily believe.

(Sign here.)..............................

Sworn to before me, and subscribed in my presence by the said....................on this........day of...........

[SEAL.]

A. D. 188 . Witness my hand and seal notarial hereunto.

....

Notary Public.

Additional forms, *i. e.* one for each individual name, will be sent on application.

Form No. 16.

I,....................., of ...., county of..........., and State of Iowa, do hereby certify that I did not receive the notice dated........... 188 , to apply for registration under the pharmacy law until............188 .

Witness my hand this........day of............, 188 .

STATE OF IOWA, }
...........County. } ss.

I,..................., subscriber to the above or foregoing instrument, being duly sworn, depose and say that the statements therein are true, as I verily believe.

(Sign here).........................

[SEAL.] Sworn to before me, and subscribed in my presence by the said.......................on this..............day of ...., A. D. 188 .

....

Notary Public in and for............county.

Form No. 17.

SECRETARY'S OFFICE,
COMMISSIONERS OF PHARMACY FOR THE STATE OF IOWA,
FORT MADISON, Iowa,...........188 .

To........................:

....

DEAR SIR—It becomes my duty to inform you that your application for registration under the Pharmacy Law has been suspended by the Commissioners of Pharmacy, your percentage of correct answers to the schedule of questions not being sufficient to warrant the Board in issuing you a certificate. You are aware, however, that you can apply for a second or re-examination at any time within one year from date, without additional fee. In the meantime you, no doubt, will prepare yourself so that you can pass a satisfactory examination, and until then you can act under the supervision of a "registered pharmacist."

Respectfully yours,

....

Commissioner of Pharmacy.

Form No. 18.

SUPPLEMENTARY EXAMINATION.

FORT MADISON, IOWA,....................188

Mr..... ....

....

DEAR SIR—The Commissioners of Pharmacy hereby notify you that they are not satisfied with your answers to the schedule of questions returned.

You will, therefore, please present yourself before either one of the Commissioners within 30 days from date, for a supplementary examination, and at once notify the Commissioner you may select, enclosing this notice and stating what day you will present yourself.

In the event that you should not pass on this, you still have the privilege for re-examination within 12 months from date of first examination.

Chas. A. Weaver, Des Moines, Iowa,
R. W. Crawford, Fort Dodge, Iowa,
Geo. H. Schafer, Fort Madison, Iowa,
Commissioners of Pharmacy.

Form No. 26.

Secretary's Office
Iowa State Board of Pharmacy.
Fort Madison, Iowa,........., 188 .

Dear Sir—Your answers to a schedule of questions were duly returned by your notary and are receiving the attention of the Commissioners of Pharmacy—no information can be given on same while in course of examination or until papers have received estimation of Commissioners. You may form an idea of the labor and time it takes to issue Certificates of Competency, when you consider that each Commissioner makes personal examination and records his estimate on every answer, noting his percentage on general average and finally exercising his best judgment whether to approve, suspend, reject or refer for oral examination. On the return of *approved papers*, certificates are prepared and forwarded the rounds for signatures of the Commissioners and on the return of same to this office they are sealed, name, etc., entered on Register, duplicate forwarded to Secretary of State and certificate issued by mail. Applicants whose examination papers are defective or unsatisfactory are promptly notified and advised of the course to pursue.

All this to be properly done involves a system of checking papers, certificates, register, etc., at every state of advancement to a final issue or rejection. This being done in regular order with all possible dispatch is for the welfare of all and is worthy the patience of applicants, many of whom burden the Commissioners with unnecessary inquiries without regard to the fact that the State has made no appropriation for any expense of that kind, the fee alone being for the expenses of the Commission *in registering* and *furnishing certificates.* Section 3 of the law qualifying that all should be done "*without expense to the State,*" it is proper that postage should accompany all necessary inquiries other than requests for blanks. Assuring you that no time will be lost to send your papers through the mill.

I remain,

Yours very truly,
Geo. H. Schafer, *Commissioner of Pharmacy.*

Form No. 27.

Secretary's Office,
Commissioners of Pharmacy for the State of Iowa,
Fort Madison, Iowa, March 28, 1881.

Whereas, official notice to register under the Pharmacy Act was mailed to all druggists in the State whose names and address could be obtained, June 1st, 1880, and subsequent dates, as per notification register; and as the time allowed by law r registration without examination expires within sixty days from date of said notice, it is hereby ordered that all others whose addresses were not obtained, be guided by this final public notice in the "Iowa State Register" and "Iowa State Leader," newspapers published at Des Moines, Iowa, and recognized by the Commissioners of Pharmacy and the Pharmacy Act as the official newspapers for publishing the same.

NOTICE.

In compliance with chapter 75, acts of the Eighteenth General Assembly, being an act to regulate the practice of pharmacy and the sale of medicines and poisons. approved Mach 22, 1880, the Commissioners appointed under authority of said act hereby notify all persons who would come under the requirements of said law to make application for registration in conformity therewth. All persons entitled to registration without examination, as per section 4, must make application within sixty days from date of this notice, or undergo an examination as provided in section 5.

By enclosing stamps, blank applications will be mailed by the Secretary, Geo. H. Schafer, Ft. Madison, to all applicants.

The Commissioners recommend all registered pharmacists to make use of their title in their business, business cards, etc., and thus exhibit to the public who are, and who are not registered pharmacists. See sections No. 1, 2, and 11, Pharmacy Law. Part of section 11 reads: "Any person not a registered pharmacist, as provided for in this act, who shall conduct a store, pharmacy, or place for retailing, compounding, or dispensing drugs, medicines, or chemicals, for medicinal use, or for compounding or dispensing physicians' prescriptions, or who shall take, use, or exhibit the title of registered pharmacist, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be liable to a penalty of not less than $50.

For any violation of the Pharmacy Act parties should be proceeded against by filing information before any justice of the peace, prosecuting-attorney, or grand jury. Official transcripts of court record, if resulting in conviction, will be the basis of our action in revoking the certificate of registration. All fines from violating this law go to the State.

C. A. Weaver,
Olaf. M. Oleson,
Geo. H. Schafer,
Commissioners of Pharmacy.

ABSTRACT

OF

STATE PHARMACY REGISTER

TO

OCTOBER 31, 1881.

ABSTRACT OF STATE PHARMACY REGISTER.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Adams, Jno. Quincy	Nora Springs	Without exam.	41
Asbury, T. P.	Eugene	"	74
Artz, David	Donnellson	"	121
Allison, W. F	Lemars	"	152
Anderson, A. G	Boone	"	209
Anderson, Alfred A	Boone	"	232
Atkins, J. B	Council Bluffs	"	328
Anderson, August	Denison	"	464
Adair, W. R	Washington	"	511
Auld, Jas. H	Dallas	"	539
Adair, Chas. R	Hastings	"	637
Anderson, L. J	Humboldt	"	641
Axhue, Wm. H	Harland	"	649
Ardery, L	Knoxville	"	676
Armstrong, J. M	Lisbon	"	755
Apland, O. C	Sheldahl	"	785
Arnold, C. V	Mt. Pleasant	"	833
Alverson, David	Marengo	"	858
Alverson, E. C	Marengo	"	859
Atwater, Frank J	Manchester	"	891
Alexander, D. E	Des Moines	"	1127
Allen, Wm. P	Dubuque	"	1134
Ayers, Warren L	Sheldon	"	1208
Anthony, N. B	Stanwood	"	1223
Armstrong, Eliza A	Seymour	"	1229
Armstrong, Thos. K	Toledo	"	1250
Arnett, Seth J	Union	"	1267
Agnew, David G	Wilton Junction	"	1294
Ahlers, Richard R	Waverly	"	1305
Allen, R. T	Centerville	"	1495
Aldrich, Edwin A	Creston	"	1497
Adams, Wm. E	Farragut	"	1505
Anderson, A. J	Red Oak	"	1532
Archer, Wm. H	Bear Grove	"	1638
Axt, Julius H	Fort Madison	By examination	1667
Amos, Albert	Nora Springs	"	1699
Arnold, Chas	Creston	"	1709
Alcorn, Jas. A	Mt. Sterling	"	1738
Anderson, Wm. M	St. Charles	Without exam.	1748
Arnold, Chas. F	Sioux City	By examination	1786
Armstrong, R. S	Indianola	"	1801
Atkinson, W. R	Monmouth	Without exam.	1826
Arnold, M. O	Mt. Pleasant	"	1843
Alexander, Rob't H	Oskaloosa	By examination	1981
Allen, B. F	Story City	"	1996
Alvord, Wm. B	Boonville	Without exam.	2035
Ashcroft, Geo. A	Webster City	By examination	2054

ABSTRACT—Continued.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Allen, B. F	Wellman	By examination	2081
Armstrong, R. B	Polk City	Without exam.	2107
Atwell, F. C	Cedar Falls	By examination	2131
Anderson, Edwin	Manson	"	2200
Ackler, Julian C	Newell	"	2202
Albee, M. P. W	Spencer	"	2237
Alexander, W. A	Leon	"	2241
Binford, E	Dixon	Without exam.	2
Balson, Jas. E	Morristown	"	8
Bickford, G. W	Independence	"	21
Buckhardt, A	Watkins	"	34
Brewster, Robt. R	Battle Creek	"	35
Bacon, U. M	Harper's Ferry	"	36
Brunk, Wm. M	Pulaski	"	46
Burnside, J. M	Waucoma	"	72
Burroughs, S. E	Holland	"	84
Bills, E. B	Durant	"	85
Bickford, D. R	Eldon	"	94
Budge, Wm. H	Rock Rapids	"	97
Bissell, Lyman N	Brandon	"	98
Beck, W. G	Leon	"	101
Beck, Chas. W	Leon	"	107
Battles, Rhoda M	Onslow	"	124
Battles, Jas. W	Onslow	"	125
Burns, R. K	Redding	"	130
Bair, Adam	Rochester	"	162
Bowman, Jno. E	Mt. Sterling	"	187
Briggs, Josephs	Springfield	"	193
Bowie, Jas	River Sioux	"	196
Brown, Caleb	Rose Hill	"	200
Boyer, Francis H	Red Oak Junction	"	204
Boemer, H. W	Iowa City	"	215
Blackman, W. W	West Mitchell	"	218
Black, Thos. A	Webster City	"	221
Benson, Jno. R	Arcadia	"	253
Brenton, J. B	Adel	"	264
Brenton, A. G	Adel	"	265
Booth, W. H	Altoona	"	267
Barstowe, E	Ames	"	280
Bousquet, Jno. J	Ames	"	281
Breese, Ambrose	Bellevue	"	297
Beardsley, Wm	Beacon	"	315
Burrows, Jno. P	Clarinda	"	323
Bailey, A. S	Cromwell	"	324
Beberger, Geo. F	Carroll	"	326
Blair, Wm. H	Clarence	"	331
Bailey, N. P	Cedar Rapids	"	332
Bye, Saml. K	Colfax	"	334
Benedict, Geo	Cascade	"	335
Bagnall, Jno. J	College Springs	"	360
Bagnall, Geo. W	College Springs	"	361
Burk, Levi	Clarinda	"	370
Billau, J. Louis	Cedar Rapids	"	377
Billau, Chas. F	Cedar Rapids	"	378

ABSTRACT—Continued.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Banning, Cyrus W	Cincinnati	Without exam.	389
Bryant, William C	Cedar Falls	"	405
Bartlett, Joseph W	Des Moines	"	416
Blackenton, William N	Denmark	"	428
Braniff, James	Dallas Center	"	444
Ballard, Jno. W	Davenport	"	449
Bigelow, I. J	Dyersville	"	451
Brayton, Charles J	Dubuque	"	457
Bullock, Charles	Denison	"	463
Baker, William	Des Moines	"	473
Booth, A. E	Prescott	"	493
Beardsley, A. M	Council Bluffs	"	521
Bayless, Frank D	Elkader	"	547
Boler, Vallintine	Elkader	"	540
Blennerhassett A	Forest City	"	573
Bradshaw, A. C. D	Fairfield	"	576
Beck, Lewis H	Farley	"	577
Baker, Bion A	Greeley	"	613
Blodgett, Milo	Greeley	"	614
Baldwin, Emmil V	Hampton	"	629
Babcock, N. W	Harlan	"	635
Buffington, C. A	Indianola	"	665
Boerner, Emil L	Iowa City	"	668
Bleakmore, J. B	Keosauqua	"	679
Bartlett, George F	Keokuk	"	690
Bronson, Andrew H	Keokuk	"	705
Bronson, Eugene C	Keokuk	"	706
Bush, Jno. V	Colesburg	"	713
Buzard, Samuel	Attica	"	727
Busch, William C. A	Davenport	"	730
Busch, Theodore H	Davenport	"	731
Blachley, Eben V	Lake City	"	741
Boynton, F. S	La Porte City	"	744
Brownell, Elias L	Spirit Lake	"	759
Brooks, Charles A	Lenox	"	768
Bissell, Charles E	Lovilia	"	776
Bissell, Virgil R	Lovilia	"	777
Batchelder, Albert M	Traer	"	778
Bliss, Ethan	Cedar Rapids	"	783
Beech, Thomas C	Cedar Rapids	"	791
Benisk, Voclav	Cedar Rapids	"	794
Boyd, Marion H	Lost Nation	"	807
Boyd, John R	Lost Nation	"	808
Blosser, George W	Moulton	"	817
Blosser, Lewis	Moulton	"	818
Bibbins, M. W	Marshalltown	"	821
Billings, M. F	McGregor	"	839
Bacher, Jno. H	Monticello	"	841
Belding, Albert L	Malcom	"	872
Blake, Mrs. Charles Pratt	Mason City	"	908
Belden, Lars T	Decorah	"	918
Bowman, James K	Beaman	"	912
Bowen, C. F	New Sharon	"	936
Briggs, LaMonte L	New Hampton	"	940
Briggs, Samuel E	Nevada	"	952

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Birney, Calvin H	Nora Springs	Without exam.	955
Berney, Matilda A	Floyd	"	956
Bristol, Albert L	Oxford Mills	"	968
Bruce, E. E	Ottumwa	"	1002
Burleigh, Frank	Odebolt	"	1015
Boardman, C. D	Odebolt	"	1016
Battin, Wm. H	Oxford Mills	"	1025
Brown, Elmer H	Osceola	"	1032
Briggs, Henry L	Oskaloosa	"	1037
Beechler, Jno. C	Oskaloosa	"	1041
Beechler, Geo. M	Oskaloosa	"	1042
Blanchaine, Chas. H	Postville	"	1059
Beckwith, Jos. C	Preston	"	1068
Boale, Malcom	Auburn	"	1109
Bush, L. H	Des Moines	"	1125
Balluff, Aug. A	Davenport	"	1126
Birney, Catharine	Floyd	"	1142
Birney, Lewis	Floyd	"	1143
Baker, Simpson P	Indianapolis	"	1146
Berchard, A. T	Marshalltown	"	1157
Berchard, P. T	Marshalltown	"	1159
Brown, Wm. K	Dubuque	"	1175
Brayton, C. S	State Center	"	1180
Brimhall, S. M	State Center	"	1181
Brimhall, Chas. W	State Center	"	1182
Baxter, Geo. W	Spirit Lake	"	1189
Brincken, Auton	Sabula	"	1198
Brown, Dan D	Storm Lake	"	1205
Bishop, Ed W	State Center	"	1232
Brayton, Jas. D	State Center	"	1233
Bames, Eugene R	Sumner	"	1245
Beach, Ed N	Troy Mills	"	1254
Bonney, Oliver D	Traer	"	1259
Baker, Elnora	Traer	"	1261
Beaver, Chas. V	Nepburn	"	1269
Brubaker, Jos. E	Vinton	"	1285
Busbank, A. W	Waverly	"	1308
Bastelman, C. F. G	Walnut	"	1318
Bent, Curtis R	West Union	"	1326
Barber, Earll	Waterloo	"	1336
Blythe, Jas. C	Woodburn	"	1342
Burnham, Milo L	Waterloo	"	1343
Burns, O	Walkers	"	1358
Byrnes, Thomas	Walcott	"	1362
Baughman, J. F	Kinross	"	1387
Birney, Ada	Greene	"	1392
Brown, W. Edgar	Mauchester	"	1410
Budde, Louis	North McGregor	"	1413
Briggs, Wm. F	Nevada	"	1414
Brinckhoff, F. W	Pella	"	1417
Baker, Ira N	Sac City	"	1452
Baker, Z. F	Lone Tree	"	1474
Baker, M	Lone Tree	"	1475
Berg, E	Charles City	"	1480
Bennett, Norman	Mechanicsville	"	1490

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Brown, Wm. C	Cresco	Without exam.	1492
Bender, W. L	Spencer	"	1502
Beman, F. W	Brush Creek	"	1515
Birney, E. E	Floyd	"	1524
Bruce, O. M	Walnut	"	1535
Benson, Nils	Burlington	"	1536
Baker, W. E	Hazelton	"	1546
Barton, A	Harlan	"	1554
Bixby, R. J	Edgewood	"	1557
Blanchard, Lewis	Edgewood	"	1558
Brown, J. A	Clifton	"	1559
Bell, S. C	Atticia	"	1562
Bennett, Lines	Mechanicsville	"	1580
Bailey, E. F	Rockford	"	1581
Byron, M. W	Fremont	"	1582
Bridges, Jno	Kossuth	"	1602
Bergen, S. R	Cantril	"	1614
Baxter, C. V	De Witt	"	1619
Bissell, Frank L	Dunlap	"	1626
Ballantyne, J. C	Brooklyn	"	1627
Brookings, D. J	Zenia	"	1633
Baker, Edwin D	Council Bluffs	"	1662
Broadie, A. A	Waverly	By examination	1691
Bell, Hugh	Kinross	Without exam.	1726
Baker, Chas. W	Des Moines	"	1729
Baker, Jno. M	Esterville	"	1737
Bailey, Dan'l V	Otley	"	1750
Brown, Jas. M	Cambridge	"	1757
Bergman, A. F	Spirit Lake	"	1769
Baxter, A	Orient	By examination	1787
Barber, Geo. M	Walnut	"	1789
Breitenstein, Chas. P	Fort Madison	"	1790
Blum, Chas. C	Rossville	Without exam.	1807
Breman, C. D	Waukon	"	1808
Babcock, E. M	Wyoming	"	1824
Baughman, Oliver F	Kinross	"	1830
Bolton, Frank P	New Hartford	"	1842
Brackett, A. B	Goldfield	By examination	1852
Bentley, A. J	Oskaloosa	"	1858
Bice, D. Corwin	De Soto	"	1870
Ballard, E. H	Estherville	"	1882
Baker, Wm. W	Hastings	"	1884
Burns, J. O	Ottumwa	"	1892
Bothwell, G. Wendell	Fonda	"	1896
Breneman, J. T	Audubon	"	1915
Brown, E. H	Burlington	"	1927
Burroughs, J. R	Washington	"	1934
Boorse, H. A	Bloomfield	"	1943
Blackmer, Benj. P	Bonaparte	Without exam.	1951
Bone, H. C	Westerville	"	1962
Bosworth, Drake S	Ames	"	1966
Brotherein, H. L	Tipton	By examination	1990
Budrow, W. C	Ogden	"	2001
Bottorf, Isaac W	Martinsburg	Without exam.	2019
Bort, Frank J	Rockford	"	2027

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Bonesteel, Wm. J	Grand Mound	Without exam.	2028
Behle, Wm. H	Garnavillo	"	2033
Bone, Jas. A	Westerville	"	2037
Barnes, D. B	Des Moines	By examination	2051
Bröcket, Milton H	Vandalia	"	2062
Bell, T. E	Newbern	"	2079
Burrough, Stephen W	Holland	"	2081
Britton, Chas. H	Winterset	"	2082
Batty, Wm. E	Muscatine	"	2098
Burr, Theo. B	Garrison	"	2100
Barr, Geo. W	Iowa City	"	2103
Brooks, Jno. E	Clinton	Without exam.	2108
Black, G. W	Elsworth	By examination	2136
Berryhill, Wm	Clarinda	"	2150
Burbank, Jerome	Allison	"	2166
Burroughs, Samuel E	Holland	"	2168
Budd, Frank Merrill	Dubuque	Without exam.	2176
Blachley, Milan A	Lake City	By examination	2177
Bodle, F. S	Grinnell	"	2182
Burns, Edwin M	Council Bluffs	"	2187
Belden, M. J	Canton	"	2189
Bradshaw, J. B	Stiles	"	2199
Butts, F. W	Wesley	"	2224
Bonner, Ephriam.	Rockwell	"	2232
Cain, Jno. G	Polo	Without exam.	10
Cross, Jno. F	Farmington	"	13
Chapman, L. A	Stanton	"	23
Coffman, H. C	South English	"	27
Coffman, W. T	South English	"	28
Clark, Lora B	Marble Rock	"	31
Cousins, Jno. A	New Hartford	"	68
Clure, Jos	Elliott	"	91
Chase, Abel E	Leon	"	103
Crane, G. W	Charles City	"	113
Churchhill, F. E	Burlington	"	117
Castle, Wm	Correctionville	"	126
Channell, L. M	What Cheer	"	135
Cross, H. H	Charleston	"	139
Cook, F. E	Maple River Junc.	"	158
Coad, N. G. O	Pattersonville	"	159
Cloughly, Wm	Audubon	"	173
Cousins, W. B	Albia	"	184
Cousins, Mrs. A. M	Albia	"	185
Cooper, S. A	Milo	"	195
Cartwright, W. H	Mediapolis	"	177
Carter, Geo	Lemars	"	214
Caughlan, Chas. R	Muscatine	"	223
Carnahan, Abraham S	Andrew	"	228
Chambers, E. A	Agency City	"	239
Cherry, J. W	Afton	"	244
Carmichael, G. O	Brighton	"	311
Cole, Thomas	Colesburg	"	336
Carpenter, S. E	Chariton	"	347

ABSTRACT—Continued.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Cowles, Arthur W	Council Bluffs	Without exam.	351
Craine, Alex. D	Des Moines	"	418
Crozer, James	Downey	"	445
Cummings, J. A	Delhi	"	452
Carnahan, Hugh	Davenport	"	460
Crowder, Jno. J	Mediapolis	"	491
Cole, T. R	Marysville	"	492
Cragg, Geo. W	Dakota	"	516
Cragg, Wm	Dakota	"	517
Conrad, Edwin	Denmark	"	519
Cooper, Sam'l M	Council Bluffs	"	522
Cook, Thos. C	New Providence	"	529
Chamberlain, Geo. W	Eddyville.	"	550
Cooley, Clayton R	Eldora	"	562
Conley, James	Eddyville	"	552
Crawford, R. W	Fort Dodge	"	582
Cheney, Jno. C	Fort Dodge	"	584
Clark, Geo. D	Fairfield	"	587
Chapman, R. S	Fort Atkinson	"	592
Cole, Jno. L	Greene	"	600
Cummings, Ira	Greenecastle.	"	608
Clark, Chas. S	Fairfield	"	588
Cummings, Albert	Greenecastle	"	609
Crow, Wm. M	Grand Junction	"	616
Capwell, Dan'l H	Garrison	"	617
Cocke, A. R	Indianola	"	650
Clark, A. B	Independence	"	662
Craig, William	Keosauqua	"	686
Camp, Americus	Kelleston	"	707
Camp, Marshall	Kelleston	"	708
Cameron, Ira F	Keswick	"	738
Conley, John (revoked)	Knoxville	"	739
Cozier, B. L	Mt. Pleasant	"	825
Carr, Aaron S	Murray	"	845
Cannon, J. H	Muscatine	"	874
Crary, Hunter C	Milford	"	893
Cattern, Frank M	Mt. Ayr	"	895
Campbell Wm. C	Mt. Ayr	"	896
Campbell, David G	Miles	"	910
Carson, Geo	New Sharon	"	935
Colman, J. B	Newell	"	957
Churchill, Frank	Burlington	"	960
Chapman, Wickliff	Bedford	"	961
Conrad, Max	Ottumwa	"	995
Castle, Chas. A	Ottumwa	"	1007
Chase, Frank W	Orchard	"	1043
Courtney, Henry	Perry	"	1049
Culbertson, Wm. F	Princeton	"	1056
Crowder, Wm. L	Rose Hill.	"	1101
Core, Geo. W	Red Oak	"	1102
Crowley, Jno. F	Atlantic	"	1147
Childs, Horace A	Lenox	"	1151
Common, Hugh	Moingona	"	1156
Calkins, Eugene M	Norway	"	1168

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Chrysler, James G	Primghar	Without exam.	1172
Cline, Wm. A.	Searsboro	"	1220
Coffin, Reuben M.	Tama City	"	1253
Chilcote, Wm. E.	Washington	"	1300
Cook, Wm. A.	Washington	"	1301
Covert, Sidney	Waverly	"	1307
Clayton, Peter B.	Battle Creek	"	1311
Cole, Orrin D.	Woodbine	"	1312
Cox, G. W.	Winterset	"	1345
Clarke, Chas. F. M.	Waukee	"	1355
Chamberlain, M. A.	Winthrop	"	1364
Coolidge, H. L.	Bonaparte	"	1369
Coolidge, O. J.	Bonaparte	"	1370
Cole, Ira W.	Bussey	"	1375
Cummings, Milford L.	LaPorte City	"	1405
Clark, Eaton K.	Seymour	"	1421
Cary, John C. W.	Atlantic	"	1437
Cooling, Albert A.	Wilton Junction	"	1450
Craig, John A.	Rippey	"	1461
Cole, D. L.	Bussey	"	1489
Clemmer, J. J.	Cresco	"	1491
Congdon, D. C.	Winterset	"	1512
Coy, Jas. W.	Dubuque	"	1513
Cunningham, J. F.	Ionia	"	1541
Clark, Chas. F.	Riverton	"	1552
Cooper, Geo. H.	De Soto	"	1572
Crawford, W. F.	Des Moines	"	1578
Chambers, R. M.	Danville	"	1606
Clarke, Edwin A.	Davenport	"	1609
Clayton, W. A.	Marble Rock	"	1615
Cary, William	Millbersburg	"	1621
Connett, A. H.	Bedford	"	1628
Childs, E. P.	Liberty Center	"	1632
Cook, D. C.	Calamus	"	1641
Cummins, E.	Moravia	"	1642
Cummins, Robt.	Moravia	"	1643
Carroll, J. M.	Pomeroy	By examination	1670
Cherry, J. E.	Afton	"	1675
Campbell, Wm. J.	Fort Dodge	"	1688
Carmichael, J. H.	Davenport	"	1708
Carter, C. W.	Rome	Without exam.	1832
Cook, S. M.	Charles City	"	1845
Campbell, Jas.	North English	"	1850
Conrad, Max	Ottumwa	By examination	1874
Chambers, David	Ottumwa	"	1880
Crosby, W. A.	Mason City	"	1881
Chamberlain, Lowell	Marvin	"	1889
Cocke, A. R.	Indianola	"	1890
Caldwell, S. W.	Sioux City	"	1935
Chapel, R. H.	Mt. Auburn	Without exam.	1948
Coaltrane, M. B.	Hopeville	"	1970
Campbell, Thos. M.	West Liberty	By examination	1987
Cutting, C. L.	Shell Rock	"	1998
Claybaugh, Jos. P.	Patterson	Without exam.	2020

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Cameron, Charles E	Storm Lake	Without exam.	2036
Comstock, D. D	Lost Nation	“	2043
Cook, S. D	Sigourney	“	2044
Crawford, James	Dodd's Station	“	2046
Caldwell, J. E	Iowa City	By examination	2052
Cooper, H. T	Grinnell	“	2084
Comstock, Charles E	Atlantic	“	2120
Coakley, Joshua W	Mount Etna	“	2126
Cochran, M. H	Morning Sun	“	2128
Corfe, Frederick	Union	“	2135
Carlisle, D. W	Lineville	“	2134
Cherry, Sam. B	Winterset	“	2152
Critz, Sylvester F	Riverside	“	2163
Camp, Eli R	Keokuk	“	2173
Carson, Jno. W	Mt. Vernon	“	2192
Christy, W. D	Afton	“	2194
Clark, Chester C	Centerville	“	2195
Conger, E. J	Manchester	“	2204
Castle, Curtis H	Wayland	“	2208
Crawford, R. W	Fort Dodge	“	2221
Cary, George T	Lewis	“	2229
Cogswell, S. S	Ottumwa	“	2234
Chase, Cyrus B	Weldon	“	2242
Deakin, H. C	Vandalia	Without exam.	47
Deakin, J. W	Vandalia	“	49
DeWoody, M. F	Nugent's Grove	“	64
Douglas, Newton J	Waucoma	“	73
Dunlavy, James	Stiles	“	77
Daggett, D. A	Sloan	“	114
Dewey, C. L	Hawkeye	“	163
Dierkes, Charles	Bellevue	“	205
Diehl, Philip H	Lemars	“	220
Dorsey, L. T	Burlington	“	312
Deetkan, Carl	Council Bluffs	“	322
Dusill, A. J	Cedar Rapids	“	333
Dunbar, George B	Center Point	“	340
Darron, Frank	Columbus Junction	“	394
Darron, William H	Columbus Junction	“	486
DeSanto, Henry W	Buffalo	“	518
Dunkee, Samuel C	Glidden	“	601
Drake, Jno. O. R	Des Moines	“	733
Dryden, William W	Lynnville	“	747
Davis, Mahlon	Lewis	“	762
Darnell, Homer L	Holland	“	782
Deutschmann, Aug	Muscatine	“	868
Davis, Nathan E	Malcom	“	878
Dawkins, Benjamin M	Mineral Ridge	“	889
Dean, C. A	Monona	“	892
Dunn, Jno. W	Derby	“	917
Dean, Rolland T	New Sharon	“	937
Durant, A. H	Algona	“	958
Durant, H	Algona	“	959
Darr, D. Byron	Ladora	“	974

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
De Noon, J. W	Lamoni	Without exam.	969
Duffield, Geo. W	Centerville	"	992
Doty, Elmer A	Oxford	"	1023
Dailey, J. F	Osage	"	1030
Durand, Harlan A	Osage	"	1026
Douglass, R. N	Postville	"	1060
Darrah. Jno. E	Princeton	"	1077
Dodge, Morris B	Randalia	"	1100
Dudley, Edward H	Shell Rock	"	1179
Duffield, H. P	Shenandoah	"	1239
Duffield, S. B	Shenandoah	"	1240
Drake, S. H	West Union	"	1323
Duff, Jno. B	Winterset	"	1348
Detlor, Bayard	Webster City	"	1360
Dyer, Thos. L	Polk City	"	1418
Donaldson, W. B	Salem	"	1448
Dalrymple, A. L	Monroe	"	1487
Deuble, Jno	Burlington	"	1516
Daugherty, Jno. B	Muscatine	"	1525
Deardorff, A. J	Perlee	"	1575
Dunkle, W. B	Gilman	"	1583
Dumont, T. A	Dumont	"	1584
De Ment, Geo. W	Grant City	"	1597
Danner, Harry M	Burlington	"	1631
De Haven, J. C	Council Bluffs	"	1658
Davis, J. D	Lamoille	"	1659
Duffield, M. J	Blanchard	By examination	1669
Davis, Harris G	Iowa City	"	1678
Duke, Chas. D	Marshalltown	"	1692
Downs, E. B	Lewis	"	1702
Dosh, J. R	Stuart	Without exam.	1730
Dosh, E. E	Stuart	"	1732
Dunn, Theodore	Fonda	"	1743
De Witt, R. M	Lucas	"	1810
Davis, M. W	Iowa City	By examination	1903
Doll, A. E	North English	Without exam.	1947
Dosh, G. W	Adair	"	1952
Dickerson, E. R	Bradford	"	1953
Daugherty, Jas. G	Muscatine	By examination	2000
Deal, Josiah	Mt. Union	Without exam.	2021
Doolittle, Sam'l U	Tracy	"	2024
Dwinnell, G. F	Sioux City	By examination	2065
De Armit, Albert	Storm Lake	"	2096
Darrah, J. E	Princeton	"	2186
Evans, Jno. M	Gowrie	Without exam.	63
Evan, Andrew J	Swan	"	197
Emeis, E. T. W	Brooklyn	"	288
Etzel, John L	Clear Lake	"	320
Everett, W. V	Council Bluffs	"	327
Eldridge, Alfred D	Clear Lake	"	339
Emeis, Heugo A	Davenport	"	443
Eddy, Wm. M	Marengo	"	500
Eyer, Edward H	Delmar	"	524

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Enright, G. A.	Aurelia	Without exam.	530
Enright, Maggie	Aurelia	"	531
Ellsworth, De Roy	Eldora	"	571
Edwards, M. G	Glenwood	"	595
Elser, J. J	Harlan	"	646
Ellis, Robt	Jefferson	"	669
Eaton, J. E	Keota	"	687
Emeis, Harry T	Durant	"	812
Eichelberger, Chas. S	Bloomfield	"	815
Elliott, Elihu N	Mt. Pleasant	"	831
Emery, Jesse	Murray	"	846
Ericsson, Gustaf B	Newton	"	926
Emery, J. F	Northwood	"	944
Elliott, Wm. D	Ottumwa	"	1004
Evans, Wm. L	Osage	"	1029
Erb, B. F	Pleasantville	"	1052
Ellis, Jno. W	Patterson	"	1065
Elliott, Oscar A	Russell	"	1087
Emmerson, Wm	Ridgeway	"	1085
Ewing, Wm. B	Burlington	"	1111
Escher, Jno. F	Lowden	"	1149
Evans, W. R	Stellaopolis P. O.	"	1200
Eldridge, Chas. G	Sabula	"	1234
Ennis, Wm. W	Ottumwa	"	1415
Evans, Mrs. E. A	Gowrie	"	1429
Evans, O. E	Gowrie	"	1430
Enfield, Chas	Jefferson	"	1569
Everett, F. J	Fairbank	"	1596
Earhart, Geo	Independent	"	1640
Eslick, Thos. B	Lehigh	"	1645
Ellerbrock, P	Orange City	By examination	1673
Ellis, Clark	Little Sioux	"	1710
Elliot, J. A	Clarion	Without exam.	1725
Ewing L. W	Springfield	"	1780
Evans, Warren B	Dow City	"	1781
Erwin, J. W	North English	"	1818
Edie, J. G	Memory	By examination	1876
Ecker, J. C	Red Oak	"	1926
Everett, F. G	Fairbank	Without exam.	1967
Espy, Geo. W	Breda	By examination	1989
Edwards, Geo. W	Reasnor	"	2008
Evans, Robert	Murray	Without exam.	2032
Elliott, W. V	Knoxville	By examination	2122
Earnest, W. H	Seymoure	"	2198
Evans, Vestus	Searsboro	"	2227
Fitch, Eugene L	Breda	Without exam.	5
Failing, Jeremiah	Marcus	"	56
Faulkner, Elizabeth	Fredericksburg	"	58
Finley, C. P	Leon	"	106
Fulk, Chas	West Grove	"	137
Fuller, Chas. M	Keokuk	"	142
Fuller, E. E	Keokuk	"	143
Freed, David A	Redfield	"	238

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Forbush, B. G	Algona	Without exam.	262
Funk, Jno. W	Colesburg	"	337
Flammant, Michael	Mineola	"	338
Fordyce, H. C	Conway	"	341
Foster, S. H	Council Bluffs	"	342
Foster, A. D	Council Bluffs	"	343
Filbert, Harry H	Decorah	"	426
Foster, H. J	Dillon	"	432
Funk, Samuel G	Des Moines	"	433
Fraatz, Fred. Chas	Dubuque	"	480
Finke, Walter H	Elgin	"	355
Fowler, Addison P	Elgin	"	557
Fuller, Mandana	Earlville	"	563
Firkins, Jno. W	Fairfax	"	572
Finch, Wm	Garner	"	618
Finch, T. F	Garner	"	619
Frost, Louis D	Harlan	"	634
Flemming, Alex. P	Harlan	"	648
Foy, Edward W	Jefferson	"	671
French, J. T	Knoxville	"	696
French, J. A	Knoxville	"	697
Freeguard, C. C	Hampton	"	719
Foster, Horatio O	Lenox	"	745
Free, A. Jackson	Traer	"	779
Findley, Jno. B	Bloomfield	"	814
Fellows, Alfred	Maquoketa	"	870
Fellows, Chas. A	Maquoketa	"	871
Fulton, A. H	Muscatine	"	873
Fry, Jno. O	Mt. Ayr	"	875
Field, E. L	Leighton	"	877
Fagan, Thos. W	Mt. Pleasant	"	879
Falker, Jno. Jr	Manchester	"	890
Frank, Perry	New London	"	934
Frank, C. S	New London	"	948
Finley, Robert	Ottumwa	"	990
Farhnham, Le Roy	Portlandville	"	1045
Forsythe, Wm. D	Pella	"	1063
Fulton, Albert D	Plainfield	"	1074
Fullerton, Geo. E	Paris	"	1076
Ford, Samuel	Talleyrand	"	1173
Ford, Jas. H	Talleyrand	"	1174
Fagan, Horace M	Shelby	"	1216
Files, Delbert G	Traer	"	1260
Fowler, R. P	Waterloo	"	1333
Forry, Wm. W	Waterloo	"	1341
Frey, Jno. A	Ida Grove	"	1396
Fowler, Isaac D	Lansing	"	1403
Franken, B	Sigourney	"	1424
Fritts, Wm. D	Burlington	"	1445
Fuller, Geo. S	Keokuk	"	1486
Forbes, Hugh	Toronto	"	1540
Fraser, Wm. W	Redfield	"	1542
Freeman, Edward	Jefferson	"	1568
Fuller, Hiram K	Monticello	"	1571

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Fish, Henry	Bear Grove	Without exam.	1639
Fletcher, W. G	Glenwood	By examination	1681
Fox, Jacob G	Waubeck	Without exam.	1751
Fitzgerald, James	Emmetsburg	"	1760
French, Chas. H	Cedar Rapids	By examination	1788
Funk, Geo. N	Audubon	"	1791
Finster, Henry J	Steamboat Rock	Without exam.	1816
Farley, N. D	Goose Lake	"	1831
Fitzgerald, Maurice	Liscomb	By examination	1855
Fretz, Menzo	Avoca	"	1866
Foster, W. E	Glidden	"	1872
Fletcher, George	Lisbon	"	1901
Frost, C. E	Oxford	"	1925
Fellows, Henry	Colfax	"	1932
Fox, Herbert J	Iowa City	"	2000
Fiddler, J. D	Iowa Falls	"	2014
Fellows, Harris	Riceville	Without exam.	2022
Fitzgerald, Jas. D	Audubon	"	2031
Ferguson, A. F	Milo	By examination	2075
Frater, J. J	Montezuma	"	2088
Frank, E. S	Livermore	"	2095
Fischer, H	Pomeroy	"	2147
Foster, J. N	Indianola	"	2174
Foltz, Geo. F	Coon Rapids	"	2212
Fewson, Thos. B	Clearfield	"	2216
Gilbert, Jonathan	Clarksville	Without exam.	4
Gillham, C. A	Leon	"	102
Greenlee, L. T	Promise City	"	111
Griffith, J. A	What Cheer	"	136
Goodrich, H. J	Maynard	"	150
Goldsberry, C. A	Iowa Center	"	164
Goldthwaite, F. O	Marengo	"	170
Gray, Jno. W	Fonda	"	178
Gore, Irvin	Atlantic	"	183
Gordinier, F. L	Adair	"	256
George, C. L	Bonaparte	"	289
George, F. B	Bonaparte	"	290
Gibbons, A. D	Bloomfield	"	301
Glover, Joseph	Waltham	"	306
Goodyskuntz, D. F	Boone	"	313
Graff, W. H	Council Bluffs	"	321
Graves, J. W	Creston	"	345
Gibbon, Wm. H	Chariton	"	346
Gesell, C. L	Cresco	"	406
Grandy, W. H	Council Bluffs	"	410
Gotwalt, Edward H	Des Moines	"	441
Grush, Wm	Deep River P. O	"	455
Greenough, James	Denison	"	462
Goodwin, F. L	Malvern	"	502
Gotshall, Geo. A	Miles	"	503
Gwathmey, Geo. O	Glenwood	"	533
Gruwell, Chas. B	Grinnell	"	621
Greig, James	Hastings	"	636

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Glendenning, E	Lineville	Without exam.	660
Grantham, Thos	Creston	"	729
Giddings, J. H	Logan	"	769
Giddings, Wm	Logan	"	771
Grosvenor, D. A	Ida Grove	"	784
Green, Nathaniel	Cedar Rapids	"	792
Gillespie, Jas. N	Cedar Rapids	"	793
Grier, David	Emmetsburg	"	800
Garretson, B. F	Osceola	"	810
Gifford, H. W	Marshalltown	"	820
Grigg, Robt. C	Murray	"	848
Goodrich, Geo. L	Missouri Valley	"	863
Geis, Henry	Muscatine	"	867
Griffin, Francis	Mapleton	"	883
Goodwin, Chas. F	Malvern	"	900
Graves, Mc. N	Denison	"	923
Gillespie, Eugene	Newton	"	933
Gardner, W. D	New Hampton	"	950
Gephart, Arthur	Ottumwa	"	993
Goss, Jos. S	Perry	"	1046
Griffis, H. J	Prairie City	"	1054
Griffin, Benj	Rockford	"	1090
Gregory, Edward M	Denison	"	1136
Gregory, Horace W	Denison	"	1137
Greenway, Nora	Muchachinock	"	1154
Guenther, Jacob H	Sabula	"	1235
Giles, Dan. R	Union	"	1266
Gourhame, Henrie	Vandalia	"	1272
Griffin, Aaron D	Vinton	"	1282
Guenther, Jno	Wheatland	"	1328
Guenther, Henry	Wheatland	"	1329
Gamble, Thos. D	Wheatland	"	1330
Goodsell, Frederick	Waterloo	"	1332
Glasgow, L. G	Washington	"	1303
Guthrie, Stephen E	Grinnell	"	1435
Graham, Israel L	Muscatine	"	1440
Gandrup, W. D	Story City	"	1463
Garfield, Leonard R	Algona	"	1483
Gunn, Jno. A	Emerson	"	1499
Gifford, D. F	Sac City	"	1506
Gilchrist, W. T	Waukon	"	1555
Given, Oliver E	Stuart	"	1574
Goodell, D. N	Ida Grove	"	1577
Goodall, Fred. T	Ottumwa	"	1599
Guash, William	Milton	"	1603
Graves, G. R	Milton	"	1604
Graeser, B	Battle Creek	"	1653
Goodykoontz, T. J	Ogden	"	1663
Gilbert, J. B	Clinton	By examination	1696
Goodall, Wallace B	Ottumwa	Without exam.	1719
Gould, C. E	Mechanicsville	"	1762
Gaddy, E. M	Shenandoah	By examination	1784
Garlock, A. W	Dayton	"	1803
Gillilan, Henry P	Viola	Without exam.	1811

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Guthrie, Jno. M	Fredericksburg	Without exam.	1849
Golliday, A. M	Bedford	By examination	1864
Gilbert, Edwin B	Iowa Centre	"	1905
George, J. M	Iowa Falls	"	1928
Gardner, Chas	Columbus Junction	Without exam.	1950
Giddings, Wm	Logan	By examination	2016
Gaston, S. H	Hayesville	Without exam.	2041
Guernsey, Wm. L	Des Moines	By examination	2048
Gesell, C. L	Sac City	"	2214
Griffith, J. C	Greenfield	"	2226
Glendenning, H. C	Lineville	"	2238
Husband, Chas. H	Waucoma	Without exam.	12
Hartfield, A. R	Vandalia	"	48
Harwood, Geo	Masonville	"	61
Himrod, Mrs. D. M	What Cheer	"	57
Hotchkiss, C. C	Pulaski	"	88
Hyde, M. J	Blandon	"	99
Hammer, T. W	Leon	"	105
Huson, E. W	Anderson	"	131
Hedges, Richard S	Kossuth	"	132
Henak, Anthony T	Oxford Junction	"	138
Hester, Thos. H	Hawleyville	"	144
Huckleberry, Alvina A	Tracy	"	146
Huckleberry, C. F	Tracy	"	145
Hubbard, F. M	Nora Springs	"	179
Husted, David W	Albia	"	186
Harris, Shorland	Mason City	"	194
Hinchman, A. C	Red Oak Junction	"	203
Hunt, Josiah K	Baldwin	"	211
Hart, James M	Grant	"	233
Henry, P. C	Bellevue	"	299
Hunter, W. A	Belle Plain	"	307
Hill, T. W	Batavia	"	308
Hill, C. S	Batavia	"	309
Hatton, Jas. W	Carroll	"	325
Harris, Benj	Creston	"	348
Harle, H. D	Council Bluffs	"	349
Huston, Geo. W	Clinton	"	352
Hartman, Chas. H	Charlotte	"	353
Hubbard, Henry C	Clinton	"	364
Henry, Jas. J	Nevinville	"	383
Hervey, James	Dubuque	"	422
Holland, A	Denmark	"	429
Hipper, Warren	Des Moines	"	431
Harrison, Jacob H	Davenport	"	469
Harrison, Chas. E	Davenport	"	470
Haas, Julius W	Dubuque	"	479
Haney, Oliver M	Dysart	"	480
Hays, Martha	Cambridge	"	496
Haldeman, Newton	Thornburg	"	505
Hogin, Jno. C	Sigourney	"	505
Hockenberg, Jas. E	Sigourney	"	512
Henie, Wm. H	Garnavillo	"	525

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Herbert, Stockton C	Des Moines	Without exam.	541
Hagensick, H. H	Elkader	"	548
Hammond, Jno. H	Eldora	"	561
Hardenbrook, George	Exira	"	564
Henry, William G	Emmetsburg	"	567
Harris, William J	Earlville	"	569
Harris, J. S	Earlville	"	570
Hufford, R. H	Fairfield	"	575
Higley, Daniel G	Fairfield	"	586
Harmon, Ardell	Farragut	"	589
Higley, T. F	Fairfield	"	593
Hull, F. S	Grinnell	"	622
Hedges, Thomas M	Grinnell	"	624
Hutchins, James H	Hampton	"	628
Harriman, O. B	Hampton	"	633
Henderson, William H	Humeston	"	644
Hovey, Horace W	Independence	"	661
Hoag, J. L	Iowa Falls	"	664
Hess, Jno. W	Iowa City	"	666
Hill, David R. M	Kellogg	"	677
Hohr, William A	Keosauqua	"	704
Hughes, J. C., Jr	Keokuk	"	724
Hyatt, Joel	Lynnville	"	748
Hahn, William F	Loudon	"	757
Hope, George T	Little Sioux	"	774
Hope, William H	Little Sioux	"	775
Henak, Mary	Oxford Junction	"	786
Haman, George C	Cedar Rapids	"	795
Harold, F. P	Clermont	"	798
Hershe, Abram B	Muscatine	"	880
Hatter, Jno. V	Millersburg	"	888
Henshie, Isaac	Mitchellville	"	899
Horne, Jno	Mt. Ayr	"	911
Hogin, George B	Newton	"	925
Hine, Jno. B	Council Bluffs	"	982
Huson, Charles A	Odebolt	"	988
Harlan, C. F	Ottumwa	"	991
Hershiser, Edward	Onawa	"	1019
Hall, Morris B	Oxford Mills	"	1024
Hall, Jno. L	Osage	"	1028
Hurlbert, Charles E	Osceola	"	1034
Hines, Ed. K	Oskaloosa	"	1038
Hayden, O. B	Panora	"	1066
Hicks, H. V	Preston	"	1067
Howenstein, William M	Parkersburg	"	1071
Hampson, James C	Fairfield	"	1079
Hatton, S. C	Riverton	"	1982
Haskitt, George M	Colfax	"	1115
Haskitt, William I	Colfax	"	1116
Huegle, H. W	Des Moines	"	1130
Hutson, Henry C	Montour	"	1164
Hansen, F	Iowa City	"	1185
Hundt, William L	Sioux City	"	1186
Hoskins, Ed	Sioux Rapids	"	1187

ABSTRACT—Continued.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Haskins, Jas. M.	Sioux City	Without exam.	1188
Hopper, Byron M.	Springville	“	1196
Hopper, Mary S.	Springville	“	1197
Hunt, Chas. H.	Stanwood	“	1224
Hale, Bernard A.	Sheldahl	“	1231
Hirschfield, Frank	Tipton	“	1257
Hapwood, A. L.	Vinton	“	1280
Hodges, Geo. W.	Winterset	“	1287
Hervy, Chas. B.	Winterset	“	1288
Hofsteater, Irene H.	Winfield	“	1297
Hanna, Jno. W.	Winfield	“	1319
Henderson, J. L.	Waterloo	“	1334
Hudson, Thos. J.	Winterset	“	1347
Hall, Solon G.	West Side	“	1349
Hopkins, C. M.	Wall Lake	“	1356
Houser, Jno. F.	West Branch	“	1363
Higby, Geo. H.	Anamosa	“	1367
Hogin. Samuel R.	Delta	“	1385
Heiser, H. C	Franklin	“	1389
Hildreth, Isaac F. (revoked)	Leon	“	1400
Hull, Justin M.	Lake Mills	“	1402
Helfritz, R.	St. Ansgar	“	1426
Heinsins, Chas.	Solon	“	1444
Howey, T. M.	Wapello	“	1446
Howey, H.	Wapello	“	1447
Heiser, Johanna M.	Franklin	“	1455
Heffelfinger, W. W.	Grundy Center	“	1457
Hyatt, N. J.	Chillicothe	“	1458
Hyatt, R.	Chillicothe	“	1459
Heath, Wm. H.	Alta	“	1467
Houghton, F. E.	Adel	“	1478
Harr, D. D.	Janesville	“	1481
Herries, Jas. S.	Janesville	“	1482
Harris, S. L.	Cresco	“	1493
Huntley, A. J.	Sargent's Bluffs	“	1496
Halstead, T. J	Savanna	“	1510
Hess, Elmer A.	Delmar	“	1517
Hansen, H. C.	Des Moines	“	1518
Hastings, E. W	Quasqueton	“	1523
Hart, Rolla J.	Low Moor	“	1530
Henry, Geo. C.	Burlington	“	1539
Hughes, Martin	Keokuk	“	1549
Howard, Henry H.	Charles City	“	1566
Hayden, Jno. D.	Liberty Center	“	1579
Hutton, Henry	Swede Point	“	1585
Hundeby, T. K.	Northwood	“	1598
Hornaday. N. S.	Lenox	“	1634
Hill, C. W.	Grand Junction	“	1636
Heine, Leonhard	Guttenberg	“	1637
Hall, Lucien W.	Ladora	“	1664
Haskell, Geo. E.	Oelwein	By examination	1686
Harlan, Chas. E.	Des Moines	“	1687
Hammer, Alfred	Des Moines	“	1689
Harlan, Laurence L.	Ottumwa	“	1695

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Hanford, Geo. S.	Charles City	By examination	1704
Harris, T. C.	Bartlett	Without exam.	1722
Herriott, Jno	Stuart	"	1731
Hartman, Jno. G	Hebron	"	1740
Hagensick, C. W	Clayton Centre	"	1744
Hill, J. A	Lineville	"	1747
Heiser, Rudolph	Keokuk	"	1724
Hart, Theodore	Galesburg	"	1770
Hubbard, L. W	Monmouth	"	1773
Hagensick, A. Chas	Read	"	1775
Hinshaw, Jno	Winterset	By examination	1785
Hayes, David D.	Cambridge	"	1802
Howell, J. M	Albion	Without exam	1809
Hinkle, Geo. W	Grainville	"	1820
Howard, F. M	Carroll City	"	1823
Hamilton, S. B.	Clarion	"	1834
Hipsley, J. J	Fort Dodge	"	1835
Hill, M. W	Dover	"	1838
Hyde, Chas. E	Odebolt	By examination	1922
Hinshaw, Wm	Des Moines	"	1929
Hardy, W. H	Clinton	"	1841
Hall, W. F	Columbus Junction.	Without exam.	1949
Hoffman, Nicholas	Lamotte	"	1955
Hill, Mrs. E. A	Dover	"	1961
Hopkins, S. H.	Wheeler's Grove	"	1971
Hall, Solon G	West Side	By examination	2003
Hoffman, Chas. L	Moravia	"	2013
Hyzer, Wm. W	Casey	"	2058
Hume, Jas. H	Scranton	"	2066
Hodge, J. L	Glenwood	"	2083
Hunt, A. B	Scranton	"	2085
Harrison, D. C	Clarksville	"	2087
Hutchinson, B. T	Fort Dodge	Without exam.	2113
Houston, O. J	Audubon	By examination	2132
Harsh, J. M	Irvin	"	2180
Henderson, H. C	Cherokee	"	2201
Harlan, Chas. L	Carson	"	2205
Horton, Frank	Gilman	"	2206
Hamilton, C. M	Pocahontas Centre.	"	2215
Hostetter, Peter	Guthrie Centre	"	2217
Hetlesaeter, Reinert	Sheldahl	"	2220
Israel, W. G	Brighton	Without exam.	317
Ink, P. P	Washington	"	512
Ingles, Chester S	Dallas	"	538
Isbell, Zari G.	Center Junction	"	537
Irwin, Jno. B	Keota	"	700
Isbell, Geo. A	Central City	"	711
Irwin, Robert P	Rockford	"	1091
Ingalls, Jos. E	Denmark	"	1576
Irwin, Chas. E	Elliott	By examination	1693
Israel, Robert	Richland	Without exam.	1718
Iorns, Henry F	Wilton	"	1945
Jilek, Joseph	Ely	"	66

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Johnston, W. S.	Big Grove	Without exam.	133
Jones, Emily R.	Grand View	"	166
Johnson, John	Brandon	"	172
Johnson, Bartlett	River Sioux	"	202
Johnson, S. M	Carson	"	236
Johnson, Ella S	Carson	"	237
Johnson, Henry	Cedar Falls	"	355
Jappe, C. F.	Davenport	"	439
Junkerman, Otto	Dubuque	"	478
Janes, Edward L	Des Moines	"	497
Johnson, Jos. G	Grinnell	"	620
Jay, Oscar O	Jefferson	"	670
Jennings, H. B.	Keokuk	"	723
James, Isaac	Laporte City	"	746
Johnston, Richard H.	Cromwell	"	789
Johnston, Robert O	Morning Sun	"	850
Johnson, Alfred	Ottumwa	"	999
Johnson, J. W	Ottumwa	"	1006
Jeppson, John	Ottumwa	"	1008
Jamison, Geo. W	Oelwein	"	1013
Junger, Hugo	Reinbeck	"	1088
Jacobson, D.	Reinbeck	"	1089
Johnson, John C.	Marshalltown	"	1160
Jones, Jos. E.	Stellapolis P. O.	"	1201
Johnson, Thos.	Woodburn	"	1313
Jones, Albert C.	Fairfield	"	1388
Jones, Cornelius A.	Fairfield	"	1390
Jones, Wm. H.	Fairfield	"	1391
Jordon, F. H.	Danville	"	1607
Johnston, Geo. P.	Iowa Center	By examination	1676
Johnson, A. M.	Spirit Lake	Without exam.	1765
Joner, J. R.	Fertile	"	1836
Jones, W. C.	Hamlin	"	1839
Johnson, L. M.	Winthrop	By examination	1853
Jones, J. B.	Denison	"	1863
Jones, G. W.	Peoria City	"	1897
Johnson, D. M.	Rockwell City	"	1982
Johnson, C. C.	Adel	"	1983
James, W. T.	Des Moines	"	2011
Joder, Josiah K.	Waterloo	Without exam.	2042
Jennings, Jos. Jr.	Wilton Junction	Bv examination	2073
Jepson, Edward M.	West Branch	Without exam.	2111
Kern, Chas. J.	Belmond	Without exam.	89
Kern, J. B.	Belmond	"	90
Kitch, J. S.	Reasoner	"	108
Keller, Geo. R.	Wapello	"	115
Keys, E. M.	Walker	"	192
Kolls, Conrad A.	Ackley	"	207
Kleinhaus, H.	Clayton City	"	216
Kimball, James H.	Webster City	"	222
Keller, A. H.	Corydon	"	385
Klinkner, John H.	Cascade	"	414
Koch, Francis J.	Davenport	"	435

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Kemmerer, Charles T.	Eddyville Junction.	Without exam.	436
King, John M	Dallas Center	“	438
Koch, Peter Theodore	Davenport	“	440
Keeler, Riley	Sidney	“	508
Kirkwood, James W	Otley	“	544
Kirkwood, T. J	Otley	“	543
Kriebs, George	Elkport	“	568
Korslund, Christ	Humboldt	“	643
Kelley, James P	Knoxville	“	673
Keer, David A	Keokuk	“	683
Kiedaisch, J. Fred	Keokuk	“	691
Kittell, E. H	Shell Rock	“	725
Kettering, Solomon	Lisbon	“	754
Kiehl, R. S	Lewis	“	763
Kelley, H. Wilbur	Marshalltown	“	822
Kempf, Albert	Monticello	“	843
Kennedy, M. G	McGregor	“	903
Kiisel, Henry L	Newton	“	929
Kearney, Edward F	Zwingle	“	972
Keeler, Banner L	Plumb Hollow P. O	“	1072
Klopp, Jno. J	Decorah	“	1132
Kepler, Thomas S	Mt. Vernon	“	1165
Keables, Benjamin F	Pella	“	1170
Keables, J. B	Pella	“	1171
Kuhn, Robert E	Shelby	“	1227
Kirk, A. M	Tipton	“	1256
Kennedy, James A	Waukon	“	1293
Keeler, William H	Des Moines	“	1380
Kinney, David F	Mapleton	“	1407
Knight, Frank B	Sac City	“	1422
Kenyon, T. F	Jesup	“	1529
Kuen, Felix E	Carroll City	“	1534
Kirkpatrick, T. W	Marne	“	1590
Keese, John	Chariton	By examination	1705
Kerns, J. T. W	Cantril	Without exam.	1734
Kynett, X. W	Hamburg	“	1756
Knaul, Rudolph	Denison	By examination	1798
Krehe, J. T.	Muscatine	“	1800
Kruskoff, Ernst	Keokuk	Without exam.	1805
Knowles, Hollis S	Avoca	“	1819
Kenyon, T. S	Grundy Center	By examination	1856
Kennedy, J. F	Waukon	“	1879
Kirby, E. R	Allerton	“	1895
Kelley, S. H	Council Bluffs	“	1902
Knowles, Seth	Searsboro	“	1911
Kelley, Franklin E	Carlisle	“	1916
Knapp, C. D	Greenfield	“	1921
Keables, H. S	Pella	Without exam.	1973
Knox, Eugene M	Audubon	By examination	1979
Kelleher, Thomas F	Bevington	“	1995
King, E. H	Clinton	Without exam.	2038
Kaufman, Edward	Waverly	By examination	2063
Keeling, Jas. H	Steamboat Rock	“	2067
Keiter, Lewis M	Grundy Center	“	2068

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Kitchen, Carl	Vandalia	Without exam.	2109
King, C. M	West Chester	"	2114
King, Albert E	Redding	By examination	2155
Kuenzel, Herman C	Garnavillo	"	2167
Killingbeck, Wm. J	Humboldt	Without exam.	2188
Lont, C. B	Delaware	Without exam.	7
Lewis, S. W	Wellman	"	39
Loyd, Levi	Stiles	"	79
Long, G. P	Perry	"	160
Lewis, William	Quasqueton	"	190
Lewis, Julian M	Randalia	"	213
La Nicca, Mart J. G	Dubuque	"	226
Lenhart, Franklin	Alden	"	261
Leonhart, C. K	Brush Creek	"	316
Loomis, Sam'l L	Casey	"	356
Lull, Albert M	Coburgh	"	357
Lanterman, G. C	Cedar Rapids	"	358
Lymer, R. H	College Springs	"	359
Loy, Jacob, Jr	Clarinda	"	379
Lerchen, Herman	Davenport	"	446
Louthan, Jno. M	Dow City	"	499
Laffer, Emanuel	Sigourney	"	509
Little, M. A	Casey	"	520
Little, Clem B	Anita	"	534
Livermore, Chas. A	Cascade	"	536
Landen, Chas	Essex	"	545
Landen, David	Essex	"	546
Larken, E. J	Emmettsburg	"	566
Lamb, Wm. M	Glenwood	"	596
Lamberson, Wm. T	Glidden	"	602
Lennon, Albert D	Guthrie Center	"	611
Livingston, Hugh	Hopkinton	"	720
Lichty, Norman	Des Moines	"	732
Lovejoy, J. H	Lawler	"	765
Lyon, Smith	Mt. Pleasant	"	832
Landis, S. L	Murray	"	847
London, L. W	Murray	"	849
Lawrence, Wm. E	Masonville	"	865
Lockwood, Jno. D	Mapleton	"	884
Lillis, L. M	Dubuque	"	920
Little, Chas	New Albin	"	949
Lezott, Chas. H	Osage	"	1027
Litchfield, A. N	Pleasantville	"	1051
Lewis, Archie J	Red Oak	"	1094
Littleton, Clarence A	Chariton	"	1120
Lauder, Chas. J	Marshalltown	"	1158
Ladd, Sam'l H	Sheldon	"	1207
Lawrence, Wm. R	Sibley	"	1210
Le Roy, Henry C	Stuart	"	1236
Le Roy, Minnie	Stuart	"	1237
Lasche, O. F	Sioux City	"	1243
Ludden, Clarence P	Tipton	"	1255
Leland, Wm. L	Vail	"	1275
Lee, Frank A	Waverly	"	1306

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Lindley, Bayard B	Winfield	Without exam.	1320
Lang, Jas. A	Wadena	“	1366
La Force, D. A	Agency City	“	1368
Lonsdale, James	Dale City	“	1381
Loucks, R. H	Danbury	“	1386
Lamoreux, R. H	Sac City	“	1423
Lewis, Edward H	Sioux City	“	1473
Lewis, M. B	Dow City	“	1508
Lewis, C. H	Des Moines	“	1564
Leonard, Ralph	Eagle City	“	1589
Lester, G. B	Hillsboro	“	1649
Longwell, Jesse	Kalona	“	1655
Langheim, J. M	Davenport	By examination	1701
Lundy, Wm. L	Coin	“	1706
Loper, Jno. C	Des Moines	Without exam.	1713
Legg, E. B	Miles	“	1742
Lantz, Henry	Colo	“	1746
Lapenotiere, E. M	Grand Junction	By examination	1792
Loar, David W	Monroe	Without exam.	1822
Lund, Gustave	Davenport	By examination	1891
Lovejoy, D. S	Lawler	“	1899
Lillie, C. W	Davis City	“	1931
Lowry, J. J	Cresco	Without exam.	1954
Lee, Francis	Clinton	“	1963
Lass, D. G	Maple Rock	“	1975
Lee, Frank A	Waverly	By examination	1978
Lauterman, G. C	Cedar Rapids	“	2005
Loper, Jas. H	Des Moines	“	2010
Lewis, Chas. H	Des Moines	“	2012
Lord, R. T. C	Des Moines	Without exam.	2034
Latter, Alexander	Iowa Falls	By examination	2053
Law, Wm. J	Muscatine	“	2055
Lane, Lewis L	Muscatine	“	2074
Lee, A. J	Waverly	“	2102
Layton, H. R	Leon	“	2130
Lewis, W. C	Clermont	“	2154
Lax, Fred C	Colo	“	2161
Lyberg, C. A. Edward	Fort Madison	Without exam.	2184
Laurence, L. C	Braddyville	By examination	2209
Leuse, R. W	Mapleton	“	2210
Lass, D. G	Webster City	“	2218
Mills, Milton T	Des Moines	Without exam.	42
McCulloch, C. H	Abingdon	“	54
Moorhead, J	Ely	“	67
McKay, B. A	Neola	“	44
McKinnis, Chas	Ioka	“	69
Merrett, S. J	Battle Creek	“	70
Morgan, D. C	Exline	“	81
McCandless, A. B	Columbus City	“	82
McCandless, Harry A	Columbus City	“	83
McKitrick, S. C	Randolph	“	96
Mallory, E. H	Harvey's Mills	“	110
Miller, H. D	Grand Mound	“	120

ABSTRACT.—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
McClure, T. G	Douds' Station	Without exam.	134
Moore, John B	Emerson	"	147
McCohn, J. T.	Holt	"	151
Mitchell, W. H	Belmont	"	161
Mullan, M. F.	Pomeroy	"	169
Muchmore, B. P	Brandon	"	171
McGuire. Jno. G.	Anamosa	"	176
Marsh, Leonard	Irving	"	181
McKenzie, H. M.	Elwood	"	188
McKenzie, Emma M.	Elwood	"	189
McBride, Israel	Webster	"	196
Moore, John	Drakeville	"	234
Miller, J. M.	Albia	"	243
Melcher, Christian A.	Griswold	"	258
Moncrief, Chas. S.	Atlantic	"	270
Moncrief, Alex. S.	Atlantic	"	271
Mansfield, F. M.	Shell Rock	"	274
Morrison, J. C.	Albia	"	278
Morrison, Ella A.	Albia	"	279
Major, E. E.	Anita	"	282
Montgomery, G. S.	Atlantic	"	283
Mitchell, Jno. H.	Bloomfield	"	285
Mitchell, Thos. G.	Bloomfield	"	286
Mitchell, Wm. S.	Bloomfield	"	287
Magoon, S. E.	Belle Plaine	"	296
McAchran, W. H	Bloomfield	"	300
McKune, A. B.	Council Bluffs	"	350
Majer, Oscar	Clinton	"	363
McCreary, Wm. M.	Centerville	"	365
Murphy, B. F	Chariton	"	366
Maulsby, Ellis P.	Casey	"	367
Milligan, Jno. W.	Corning	"	368
McIrvin, Wm. C.	Clarinda	"	369
Meyers, B. F.	Charlotte	"	371
Morgan, Frank L	Cedar Falls	"	372
Mitchell, Wm. F	Des Moines	"	417
Maffett, Benj.	Dubuque	"	423
Mickley, E. G. F.	Davenport	"	434
Moss, Frank J.	Davenport	"	448
Manning, A. L.	Dunlap	"	461
Mason, Jas. B.	Davenport	"	472
Manrid, Romanus	Dysart	"	483
McLaughlin, J. B	Delmar	"	523
Meisner, Amilius	Davenport	"	535
Mills, Jno. M.	Des Moines	"	540
Mifflin, Chas. W	Cedar Rapids	"	542
McManus, Jas. N.	Eddyville	"	558
McManus, Dinah W.	Eddyville	"	559
Morden, W. C.	Fulton	"	578
McConnell, F. A.	Fort Dodge	"	580
Morgan, B. W	Fort Dodge	"	590
Morgan, Isaac G.	Fort Dodge	"	591
McCullough, M. J.	Guthrie	"	604
McCluskey, M. H.	Glenwood	"	605

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Mann, Jas	Hamburg	Without exam.	638
More, Chas. W	Janesville	"	672
McGrath, Thos. J	Keokuk	"	695
McFarland, Dan	Keota	"	699
McConaughey, S. D	Keota	"	701
Morton, Jno. A	Keosauqua	"	702
McBeth, Wm	Keosauqua	"	703
Moir, Alex	Britt	"	709
Montgomery, J. H	Decorah	"	715
Montgomery, M. H	Decorah	"	716
McVay, Josiah D	Lake City	"	742
Markley, Geo. H	Lansing	"	753
Manz, Const S. L	Lyons	"	761
McKeever, M. B	Prairie City	"	766
McNay, Jno. S	Greenfield	"	802
Morrow, Jno. B	Greenfield	"	803
Mountain, Noble W	Lettsville	"	804
McGirr, Carrie J	Osceola	"	809
McEacham, Jno	Marne	"	813
Marsh, Wm. A	Mt. Pleasant	"	828
Marsh, Chas. F	Mt. Pleasant	"	829
Marsh, W. S	Mt. Pleasant	"	830
Miller, Geo	McGregor	"	840
Miller, C. E	Montezuma	"	856
Mandeville, F. L	Missouri Valley	"	864
Myers, Jos. V	Mt. Vernon	"	866
Munger, Jos. P	Malvern	"	901
Martin, G. S	Maquoketa	"	905
Mallary, Dwight	Boonsboro	"	915
Mallary, Adela	Boonsboro	"	916
Moerschell, Wm	Amana	"	922
Morrison, O. J	Nashua	"	939
McMullan, F. A	New Hampton	"	941
Maxwell, Jno. H	Davenport	"	964
Miles, A. H	Des Moines	"	981
Mills, C. J	Ossian	"	1011
Mulford, C. E	Ottumwa	"	998
Morgan, J. W	Oskaloosa	"	1036
Mays, Will S	Oskaloosa	"	1040
McNabb, Thos. J	Panora	"	1050
Mealey, D. H	Pleasant Plain	"	1053
Murray, Thos	Plymouth	"	1073
Marietta, J. C	Palmyra	"	1075
Miller, Edson C	Rockwell	"	1099
Maxwell, N. J	Ainsworth	"	1106
Miles, Henry F	Charles City	"	1122
Miles, Wilbur F	Charles City	"	1124
McDermid, Peter	Fontanelle	"	1140
Myers, Snowden	New Sharon	"	1169
Miller, F. E	Shenandoah	"	1191
Mather, William	Springdale	"	1192
Mather, Chas. E	Springdale	"	1193
Morrison, Julius W	Spencer	"	1212
Moore, William G	Silver City	"	1214

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Morton, J. B.	Minden	Without exam.	1218
Machesney, W. T.	Salina	"	1244
McAhren, Wm. J.	Vail	"	1274
Montain, Howard	West Liberty	"	1290
Mathews, F. M.	Winfield	"	1298
Meyer, Henry	Waterloo	"	1335
Miller, C. D.	West Side	"	1350
Miller, A. H.	Webster City	"	1352
McGrew, Jas. B.	Wyoming	"	1353
McDermid, D., Sr	Victor	"	1277
McDermid, D., Jr	Victor	"	1278
Merrill, Chas. H.	Burlington	"	1371
Meservey, S. T.	Fort Dodge	"	1394
McColm, Louis F.	Holt	"	1395
Myers, Jacob W.	Lemars	"	1401
McBride, Wm. S.	Marshalltown	"	1409
Merrill, W. F.	Manchester	"	1411
Maurer, August	Garnavillo	"	1431
McCandless, A W.	Columbus City	"	1434
McCandless, C. R.	Columbus City	"	1443
Miller, Wm. L.	Lacona	"	1464
Martyn, H. P. A.	Newell	"	1477
McColm, Wm. J.	East Nodaway	"	1484
McColm, Cyrus B.	East Nodaway	"	1485
Martin, Z. L.	Idaho	"	1494
McCargar, A. T.	Spencer	"	1501
Moon, Milton J.	Iowa City	"	1506
Moon, A. R.	Iowa City	"	1507
Morrison, Wm. A.	Iowa City	"	1527
Moore, Oscar F.	Des Moines	"	1543
Moore, S. B.	Des Moines	"	1544
Mechener, M. W.	Andrew	"	1550
McVay, Jacob H.	Attica	"	1561
Muhs, Peter	Camanche	"	1587
Maxly, A. D	Kellogg	"	1605
Mallory, D. M.	Harvey Mills P. O.	"	1661
McEwen, Chas. A	Independence	By examination	1672
Merritt, Fred. D.	West Union	"	1680
Mendenhall, Horace.	Bloomfield	"	1690
McCullough, Will A.	Mediapolis	"	1711
Miles, Isaac N.	West Branch	Without exam.	1754
Maxwell, Geo. M.	Cambridge	"	1768
Miller, Jno. K.	Spragueville	"	1776
Maleham, Joseph.	Riverton	By examination	1793
McCrea, Henry A.	Albia	"	1799
Morey, Jas. P	Storm Lake	"	1804
Manwell, Lucius	Guthrie	Without exam.	1815
McKeehan, Francis H.	Davis City	"	1833
Milliken, Schuyler C.	Stiles	"	1837
Marolf, J. F.	Wilton	"	1841
McMahan, Jas. C.	Council Bluffs	By examination	1860
McDonald, J. W.	Morning Sun	"	1878
McElhenny, J. W.	Marion	"	1887

ABSTRACT—CONTINUED.

NAMES.	NAMES.	HOW REGISTERED.	No. of certificate.
Moncrief, Chas	Atlantic	By examination	1917
Miller, Harry S	Vinton	"	1920
Maish, Geo. H	Des Moines	Without exam.	1946
Macy, E. C	Pleasanton	"	1968
Moody, W. J	Horton	"	1976
Moore, Geo. R	Garfield	By examination	1977
Meacham, J. E	Clarinda	"	1988
Miller, Jno. S	Clinton	"	2006
Middleton, Chas. H	Bentonsport	Without exam.	2017
McConnaughy, Wm. D	Monroe	"	2030
Morgan, Wm. D	Chillicothe	"	2040
Miller, Wm. L	Norwalk	"	2045
Molesworth, J	Norwood	By examination	2059
Masters, Stephen H	Marne	"	2060
Myers, Jonathan R	Iona Center	"	2078
Merritt, W. H	Hartford	"	2080
McCauley, O. G	Rowley	"	2099
Marvin, H	Sioux City	"	2101
Martin, M. T	Woodburn	"	2123
McLain, Geo	Vail	"	2138
Michel, B	Dubuque	"	2139
Mitchell, A. J	Macedonia	"	2148
McElwain, R. H	Clarksville	"	2143
Maxwell, J. P	Westerville	"	2149
Mentor, Marc	Newell	"	2160
McGonigle, W. A	Monona	"	2162
Moorse, W. E. H	Stuart	"	2178
McClurg, M. P	Council Bluffs	"	2181
Millard, Chas	Nashua	"	2188
Mather, J. W	Davis City	"	2190
McCoy, Hugh	Seymour	"	2193
Martin, Rosa R	Marshalltown	"	2225
McDermid, D., Jr	Victor	"	2235
Nerby, Levi B	Lake Mills	Without exam.	11
Northey, Silas	Conesville	"	29
Neinstardt, Herman	Dubuque	"	45
Nesper, Fred T	Muscatine	"	50
Numalby, L. B	Hartford	"	62
Newell, W. M	Melrose	"	128
Nichols, Corneilus	Essex	"	229
Nichols, Wm. M	Atlantic	"	247
Nichols, H. V	Allerton	"	268
Nichols, Jonathan	Atlantic	"	272
Nichols, Edward	Belle Plaine	"	295
Nash, R. M	Creston	"	319
North, Henry	Casey	"	373
Nordstrum, Gus	Dayton	"	425
Nolte, Henry H. J	Davenport	"	471
Nelson, Robt. G	Eddyville	"	551
Nosler, James	Eddyville	"	560
Navins, Jno	Greene	"	599
Nickson, E. D	Humboldt	"	645
Norcross, David L	Keota	"	688

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Nadler, Frank	Davenport	Without exam.	714
Norton, H. M	Kent	"	722
Norman, Chas	Muscatine.	"	819
Nott, Benj. H	Harrison	"	854
Niehaus, E. W	Burlington	"	1112
Neff, Jno. D	West Union	"	1324
Neff, Chas. G	West Union.	"	1325
Newton, Martin L	La Porte City	"	1404
Nase, F. P	Grundy City	"	1428
Norris, T. O	Troy	"	1453
Nash, A. F	Sioux City	"	1472
Nesmith, M. W	Waukon	"	1565
Nachtwey, Theo	Lansing	"	1563
Nowlan, David	Reasnor	"	1717
Nichols, Wm. E	Wyoming	"	1772
Newman, M. M	Edgewood	By examination	1994
Nicaise, Gustave	Burlington	"	2164
Nauerth, J. H	Tama City	"	2194
Parrott, Jos. D	Blanchard	Without exam.	1
Playter, John B	Bristow	"	3
Pouge, J. I	Wiota	"	18
Perrin, Willard	Floyd	"	22
Price, Mrs. S. E	Exline	"	80
Pogue, J. A	Lacona	"	93
Peters, C W	Fort Madison	"	122
Pitman, W. G	West Point	"	153
Phillips, E. W	Prairieburg	"	212
Parkhurst, Frank G	Belle Plaine	"	230
Porter, J. H	Adair	"	249
Potter, Isaac L	Ackley	"	266
Painter, J. V	Bloomfield	"	305
Parker, J. W	Cedar Falls	"	354
Pool, P. V. M	Carpenter	"	375
Pope, N. D	Cedar Rapids	"	376
Parish, Frank W	Clarinda	"	380
Pinkerton, Jas. H	Dysart	"	419
Patterson, S. J	Dunlap	"	474
Parker, J. H	Des Moines	"	481
Price, H. C	Cresco	"	487
Pipher, John	Griswold	"	627
Pryor, Wm. A	Logan	"	642
Phillips, Jno. S	Independence	"	652
Peregrine, Chas. S	Brooks	"	728
Pocock, Jos. J	Lemars	"	749
Parsons, Gilmore	Lovilia	"	751
Pettit, Wallace W	Luana	"	767
Parkhurst, Frank W	Ladora	"	772
Putman, Jas. M	Holland	"	781
Phelps, Jos. A	Carbon	"	796
Pinckney, Jas	Forest City	"	801
Plumb, Edwin B	McGregor	"	823
Phillips, Walter J	Mt. Pleasant	"	826
Pyle, Sam'l M	Mt. Pleasant	"	887

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Peterson, Samuel J	McGregor	Without exam.	838
Putman, Rufus A	Monticello	"	844
Power, William G	Mt. Vernon	"	898
Parkhurst, H. H	Marengo	"	909
Parmenter, R. F	Newton	"	932
Phillips, George F	New Hampton	"	942
Pfeiffer, Henry Jr	Cedar Falls	"	983
Peters, Harry C	Ottumwa	"	1009
Pitman, Jno. S	Ogden	"	1021
Prole, Albert W	Osceola	"	1031
Porter, James N	Prairie City	"	1056
Peters, William E	Pleasanton	"	1078
Pool, Don A	Prairie City	"	1080
Powell, George R	Red Oak	"	1098
Payne, Miss Annie E	Richland	"	1103
Pegram, Hardin	Red Oak Junction	"	1104
Porter, Sam. B	Afton	"	1107
Prather, B. R	Columbia	"	1114
Palmer, Almon D	Maquoketa	"	1155
Powers, George P	Marshalltown	"	1161
Palmer, Alvira S	Searsboro	"	1194
Perry, Charles H	Sanborn	"	1203
Pratt, William T	Solon	"	1209
Painter, David	Spencer	"	1211
Potter, James M	Sheffield	"	1213
Palmer, Jacob H	Searsboro	"	1221
Pudney, Nathan A	Springville	"	1195
Parks, Hinton F	Storm Lake	"	1204
Penn, Alphonso V	Sidney	"	1225
Parker, William L	Sibley	"	1226
Patterson, O. A	Sioux City	"	1242
Palmer, Henry N	Vinton	"	1281
Palmer, Walter S	Vinton	"	1283
Palmer, Thomas S	Vinton	"	1284
Pierce, W. H	Alta	"	1286
Pickering, Charles E	West Liberty	"	1299
Pomeroy, J. C	Waverly	"	1309
Peterson, Jacob J	Walnut	"	1317
Packard, George H	Webster City	"	1351
Pentecost, Levi J	Panora	"	1439
Packard, Ira W	Webster City	"	1469
Pride, J. W	Whittemore	"	1479
Palmer, Helen E	Vinton	"	1500
Peek, Seman	Brooklyn	"	1504
Phelps, Jno. H	Guthrie Center	"	1514
Perrine, Demas	Welton	"	1522
Price, J. W	Burlington	"	1538
Porter, Edwin C	Dubuque	"	1588
Potter, B. B	Lamoille	"	1611
Platt, W. D	North English	"	1644
Pool, Sophia M	Carpenter	"	1646
Porter, Mattie A	Swedesburgh	"	1650
Porter, J. J	Swedesburgh	"	1651
Packer, F. M	Earlham	"	1660

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Parsons, Fayette	Adair	By examination	1677
Peregrine, J. S	Brooks	Without exam.	1714
Peabody, J. H	Rippey	“	1739
Penn, J. N	Sidney	“	1812
Perry, Ross W	Boone	“	1814
Prall, D. E	Ottumwa	“	1846
Powell, L. E	Charles City	“	1847
Padden, Loren	Fredericksburg	“	1848
Plitt, H. A	Wapello	By examination	1868
Putnam, Mart A	Marion	“	1877
Pryor, W. C	Essex	“	1886
Peterson, C. Peter	Des Moines	“	1909
Page, E. M	Spencer	“	1924
Peterson, Jonas B	Boone	Without exam.	1957
Pellham, W. S	Kirksville	“	1964
Price, John M	Buffalo Grove	“	1974
Pergrin, Isaac D	Bentonsport	“	2018
Prather, A. W	Lineville	“	2026
Penn, J. H	Sidney	By examination	2056
Peterson, Perry H	Iowa Center	“	2057
Price, L. J	Tama City	“	2097
Platt, Joseph S	Alta	“	2141
Pierce, Griffith R	Blairstown	“	2156
Peck, P. B	Alden	“	2158
Person, A. H	Ames	“	2228
Quire, James C	Lynnville	Without exam.	1152
Quire, Chas. E	Lynnville	“	1153
Quirk, W. T	Aurelia	By examination	1913
Robbins, C. S	Neola	Without exam.	15
Rust, David	Whiting	“	33
Russell, H. A	Centerville	“	51
Robyn, Edward	Luzerne	“	55
Robinson, S. S	Polk City	“	86
Ray, J. A	Leon	“	104
Reisener, F. O	West Point	“	118
Reisener, Mrs. Mary	West Point	“	119
Rhoads, H. M	Clarksville	“	123
Roberts, Mary F. Q	Osceola	“	140
Rice, Ulisses A	Commerce	“	165
Robbins, Willard	Farragut	“	167
Reynold, A. J	Agency City	“	175
Rogg, Chas. W	Des Moines	“	182
Rolling, John	Bellevue	“	206
Rice, Clarence C	Boone	“	231
Roberts, W. H	Ackley	“	242
Reeme, Ira J	Afton	“	245
Read, S. G. A	Algona	“	254
Read, Lizzie B	Algona	“	255
Roberts, A. H	Audubon	“	269
Richardson, Romain	Blairstown	“	303
Richardson, Geo. A. B	Blairstown	“	304
Richter, Adolph H	Burlington	“	291

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Ragsdale, J. S	Birmingham	Without exam.	310
Ragsdale, E. E	Birmingham	"	318
Rawson, Homer C	Corning	"	381
Rawson, Allen A	Corning	"	382
Rogers, Oscar K	Corydon	"	384
Randolph, Jacob W	Des Moines	"	427
Richmond, Jas. A	Dallas Center	"	437
Rigg, James	Dubuque	"	465
Roberts, Fred J	Dunlap	"	467
Robinson, J. H	Davis City	"	476
Ruete, Theo. W	Dubuque	"	477
Ramsay, Robt. B	Blakesburg	"	485
Rush, Warren B	Sidney	"	507
Rees, Wm. W	Hamburg	"	639
Robinson, T. J	Harlan	"	647
Raffans, Henry W	Independence	"	653
Rigg, T. J	Iowa City	"	667
Rankin, Thos	Keosauqua	"	685
Resley, John	Le Grand	"	756
Rowland, Thos. H	Council Bluffs	"	770
Roberts, Rose S	Ackley	"	787
Roberts, James	Montezuma	"	857
Rice, Jno. D	Mapleton	"	885
Reichard, D. H	Mitchellville	"	902
Richards, Clark L	Davenport	"	965
Rudolph, Chas	Decorah	"	978
Ramsey, Alfred A	Albia	"	985
Rummel, David E	Olin	"	1017
Randall, F. G	Ottumwa	"	997
Roberts, Jason	Osceola	"	1033
Renken, Eno C	Parkersburg	"	1069
Ray, Frank P	Parkersburg	"	1070
Ross, Lon F	Red Oak	"	1097
Roach, Fred	Chelsea	"	1117
Ruff, Oscar	Dubuque	"	1133
Rumsey, Jno. J	Denison	"	1135
Reeves, Alvin B	Norway	"	1167
Reynolds, Geo. W	Shellsburgh	"	1183
Reeves, Thos. J	Seney	"	1202
Rogers, Hiram S	Corydon	"	1206
Radermacher, Henri	Stanwood	"	1222
Ruemmele, Theodore A	Shelby	"	1228
Roberts, Benj. F	Scranton	"	1230
Reeves, I. C	Salem	"	1238
Rigg, Thos	Tipton	"	1258
Renoe, Edward E	Union	"	1265
Ross, Thos. B	Van Meter	"	1273
Ryerson, Maurice W	Wilton Junction	"	1289
Robbins, Alvin E	Waukon	"	1291
Ross, Jr., Wm. P	Wilton	"	1295
Ross, Sr., Wm	Wilton	"	1296
Richards, G. B	Washington	"	1302
Rodman, A. A	Washington	"	1304
Rippey, London	Winterset	"	1344

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Robbins, Francis H	Waukon	Without exam.	1292
Robertson, Frederick W	Waterloo	"	1331
Riggen, Jno. A	Wellman	"	1365
Rhoads, John P	Bedford	"	1374
Rhoads, H. B	Bedford	"	1376
Rhoads, Isaac L	Bedford	"	1377
Rees, L. A	Des Moines	"	1383
Rice, Chas	Smithland	"	1419
Rice, Richard C	Smithland	"	1420
Rockhold, J. E	Clio	"	1438
Rienicke, G. A	Muscatine	"	1441
Riggs, Wm. K	Castalia	"	1531
Rhodes, Thos. H	Kossuth	"	1601
Runkle, Wm. H	Lisbon	"	1617
Roff, H. J	De Witt	"	1620
Reininghouse, Mrs. E	Cantril	"	1630
Rowland, W. E	Altoona	"	1654
Ritz, Reinhart	Independent	"	1666
Roberts, Harry	Atlantic	By examination	1684
Rodearmel, R. H	Nevada	Without exam.	1716
Roos, Julius G	Keokuk	"	1723
Reiterman, Chas	Le Grand	"	1736
Rosser, W. H	Troy	By examination	1782
Rathburn, I. H	Clinton	"	1794
Reid, Chas. C	Sabula	"	1862
Reed, A. L	Manson	"	1869
Rankin, J. B	Allerton	"	1873
Riggs, J. S	Allison	"	1875
Riepe, A. C. H. E	Davenport	"	1885
Reiss, H. C. A	Iowa City	"	1894
Reppert, Ferdinand	Muscatine	"	1904
Robinson, Hiram A	Oxford	"	1906
Rudolph, R. F	Decorah	"	1923
Robinson, L. B	Big Grove	"	1985
Reel, Z. T	Des Moines	"	1997
Rhoades, John	Fayette	"	2002
Rightmire, Geo	Corning	"	2007
Rosecrans, Daniel	Harper	Without exam.	2029
Raudabaugh, G. S	Braddyville	By examination	2049
Reyner, Marcus	Baldwin	"	2050
Roush, Geo. R	Sidney	"	2071
Reel, A. R	Des Moines	"	2086
Riggs, J. A	Holland	Without exam.	2115
Root, J. K	Marengo	By examination	2117
Rockafellow, J. B	Atlantic	"	2121
Rice, Chas. W	Cantril	"	2165
Rupert, Lawrence M	Marion	"	2170
Rowell, C. J	Afton	"	2179
Rowcliff, Jas. F	Des Moines	"	2213
Richardson, Wm. H	Orient	"	2219
Starr, J, W	Lacona	Without exam.	9
Sherman, Milo L	Fredericksburg	"	14
Smith, Cameron	Carlisle	"	16

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Smith, J. O	Floris	Without exam.	17
Stafford, David	Kellerton	"	20
Sinnard, Cyrus	Kirkville	"	24
Stevens, Jno. R	Cantril	"	25
Schen, Chas	Stacyville	"	26
Snyder, H. K	Grinnell	"	37
Seidler, Wm	Minburn	"	53
Stearns, L. A	Fredericksburg	"	59
Stanley, C. W	Decatur City	"	60
Sharp, David	Promise City	"	78
Sheman, J. M	Paton	"	87
Shepard, A. J	Randolph	"	95
Swearingen, A	Leon	"	100
Sowles, Edwin E	Nora Springs	"	112
Satterthwait, J. W	Mt. Pleasant	"	127
Sherman, Nancy B	Grafton	"	129
Sayers, Wm	Cincinnati	"	149
Sumner, J. M	Walkerville	"	157
Smith, Wm. H	Marysville	"	191
Salmon, M. M	Burlington	"	199
Strobridge, Chas. A	Monoa	"	210
Schancks, F. B	West Mitchell	"	219
Stewart, Thos. S	Rock Falls	"	224
Shumway, M	Brush Creek	"	292
Sheetz, L. A	Algona	"	240
Stauffacher, D. R	Ackley	"	241
Sherman, Jno	Anita	"	246
Straight, S. W. W	Atlantic	"	259
Schultz, H. E	Alden	"	260
Smith, W. H	Shell Rock	"	273
Skinner, Wm. B	Anamosa	"	275
Skinner, Wm. M	Anamosa	"	276
Skinner, Mary A	Anamosa	"	277
Severa, Vencel	Belle Plaine	"	302
Smith, Joseph T	Corning	"	329
Sylvester, Wm	Cherokee	"	386
Sylvester, W. G	Cherokee	"	387
Sturdevant, Jno. M	Cincinnati	"	388
Swafford, Isaiah	Carlisle	"	390
Stanosheck, Frank J	Cherokee	"	391
Stephenson, Robert, Sr	Centerville	"	392
Salmon, G. A	Columbus Junction	"	393
Smith, Geo. E	Clarence	"	395
Stiles, Arthur E	Calmar	"	396
Sherman, Chas. R	Des Moines	"	430
Schlegel, Gustave	Davenport	"	447
Smith, R. W	Dyersville	"	453
Smith, David S	Dyersville	"	454
Stanley, J. G	Dexter	"	456
Stephenson, J. E	Davenport	"	459
Satterlee, Dwight	Dunlap	"	466
Schmidt, Wm. Fred	Dubuque	"	468
Satterlee, E. S	Dunlap	"	475
Slawson, Frank M	Cresco	"	488

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Sheffield, Richard H	Gifford	Without exam.	489
Snyder, O. H	Malvern	"	501
Shaffer, Jno. M	Monticello	"	504
Springer, Jas. T	Norway	"	513
Springer, S. H	Norway	"	514
Swan, L. M	Aplington	"	515
Sproatt, Wm. S	Corydon	"	526
Study, Eugene	Corydon	"	527
Shipman, R. M	Emerson	"	554
Smith, Horace W	Garner	"	594
Scar, Geo. F	Griswold	"	597
Sayre, Albert H	Guthrie	"	603
Schussler, L. F	Grinnell	"	612
Simmons, Jno. B	Garden Grove	"	615
Snodgrass, Frank	Hamburg	"	640
Smale, Geo	Independence	"	651
Scott, Wm. J	Ida Grove	"	654
Scott, J. C	Ida Grove	"	655
Stafford, Eugene J	Kellogg	"	678
Strickling, Jos. C	Keosauqua	"	680
Schulenburg, Robert	Keokuk	"	684
Stuckert, Wm	Keokuk	"	692
Schrader, W. E	Iowa City	"	721
Smith, Chas. E	Memory	"	726
Stephenson, A. C	East Des Moines	"	734
Stempel, Arthur H	Fort Madison	"	736
Sill, Frank M	Goldfield	"	737
Seaver, Bert	Cedar Falls	"	740
Swan, Balmore F	Lake City	"	743
Schenk, G. W	Lyons	"	760
Snyder, Dan. B	Lyons	"	764
Sanford, H. C	Sigourney	"	773
Stephens, Cyrus R.	Traer	"	780
Sartori, Anton	Cedar Falls	"	790
Stone, Frank C	Carbon	"	797
Snider, Chas	Mt. Pleasant	"	834
Snider, David S	Mt. Pleasant	"	835
Snider, Howard E	Mt. Pleasant	"	836
Shiley, Geo. P	Missouri Valley	"	852
Shiley, D. A	Missouri Valley	"	853
Summers, L. F	Milton	"	869
Struthers, Wm. H	Mt. Ayr	"	876
Sawyers, David A	Macksburg	"	897
Stephens, Jno. H	Montour	"	907
Scott, Walter G	Des Moines	"	914
Smith, Harry C	Manchester	"	919
Sellars, Harry F	Dubuque	"	921
Solberg, Hans D	Decorah	"	924
Scribner, Wm. H	Newton	"	930
Skiff, Harvey J	Newton	"	931
Stevens, C. S	Lime Springs	"	943
Stafford, Jas	Nichols	"	947
Stafford, Jno. R	New London	"	953
Scott, Jno	Calmar	"	963

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Stevens, Delos D	Lafayette	Without exam.	973
Smith, John R	Kellogg	"	975
Smith, Jas. A	Kellogg	"	976
Schafer, Geo. H	Fort Madison	"	987
Stoops, Curtis	Odebolt	"	989
Smith, Wm. C	Ottumwa	"	996
Sprague, Parley B	Ottumwa	"	1000
Steinson, Jas	Ossian	"	1010
Summerville, Wm. J	Odebolt	"	1014
Somers, Jno. W	Onawa	"	1018
Schultz, Chas. E	Ogden	"	1020
Stebbins, Richard	Onawa	"	1044
Staadt, Anton	Postville	"	1057
Staadt, Godfrey	Postville	"	1058
Swayze, Henry A	Richland	"	1083
Sprague, J. F	Russell	"	1084
Shank, Jefferson	Red Oak	"	1093
Shank, Henry C	Red Oak	"	1095
Spear, Francis A	Algona	"	1105
Shafer, J. A	Burlington	"	1110
Storie, D. Q	Chariton	"	1119
Seay, Peter	Afton	"	1108
Schroeder, Frederick	Des Moines	"	1128
Sandholm, Jno. A	Des Moines	"	1129
Spaulding, S. J	Des Moines	"	1131
Smith, Ellis M	Eldora	"	1138
Scott, Calvin B	Fontanelle	"	1141
Smits, Henry	Garnavillo	"	1144
Stover, Noah W	Lucas	"	1150
Shepard, Nathaniel	Mondamin	"	1163
Scobey, Jno. G	Shell Rock	"	1177
Stonebreaker, A. G	Shell Rock	"	1178
Scofield, Geo. H	Strawberry Point	"	1215
Springer, Newton T	Toledo	"	1246
Springer, Joshua N	Toledo	"	1247
Springer, Geo. L	Toledo	"	1248
Stidger, Stephen	Toledo	"	1249
Soleman, Henry	Tama City	"	1252
Safford, W. G	Villisca	"	1270
Stennett, Daniel	Villisca	"	1271
Scofield, Proctor D	West Union	"	1327
Shutts, Harvey L	Waterloo	"	1337
Snowden, Wm	Waterloo	"	1340
Sifford, Lewis J	Wall Lake	"	1357
Snyder, Geo. W	Western	"	1359
Stone, Geo. W	Chariton	"	1379
Scoles, Chas. S	Knoxville	"	1397
Scoles, Hamilton J	Knoxville	"	1398
Sullivan, Fielding	Kellerton	"	1399
Stephens, Wallace	Sidney	"	1433
Stephenson, Chas. N	Troy	"	1454
Stolte, Louis C	Franklin Center	"	1456
Smith, Chas. E	Shellsburg	"	1468
Sweet, Homer L	Mt. Etna	"	1476

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Sayres, Arlington, M	Cincinnati	Without exam.	1488
Stewart, Jno. H	Crawfordsville	“	1498
Smith, Albert B	Winterset	“	1511
Silverthorn, O. E	Creston	“	1521
Stewart, Sesco	Big Grove	“	1545
Salmon, Jos. F	Fort Madison	“	1547
Salmon, Theo	Fort Madison	“	1548
Smith, Thos. E	De Soto	“	1573
Smith, F. H	Villisca	“	1586
Sturges, N. F	Carroll	“	1608
Smith, T. H	Creston	“	1616
Sikkema, H. H	Butler Center	“	1622
Stuckert, Otto	Keokuk	“	1629
Scroggs, J. P	Lenox	“	1635
Stempel, G. L	Cedar Bluffs	“	1648
Smith, Mrs. I	Abingdon	“	1656
Shephard, Jas. M	Davis City	“	1665
Spendlove, William	Dunlap	By examination	1668
Stratton, Herbert R	Red Oak	“	1679
Stuart, Jas. D	Mondamin	“	1682
Souers, Webb	Des Moines	“	1685
Smith, H. C	Moulton	“	1697
Stevens, Geo. L	Dexter	“	1698
Smith, C. F	Nichols Junction	“	1700
Schmucker, D. R	Des Moines	Without exam.	1712
Scott, E. M. B	Ottumwa	“	1720
Swartz, M. H	Grundy Center	“	1721
Squire, Jos. A	Amish	“	1728
Steen, Jno. J	Reno	“	1741
Slusher, J. M	Primrose	“	1752
Satterlee, D. S	Guthrie Center	“	1755
Sherwood, Jos. B	Viola	“	1759
Snowden, Jno. E	Waterloo	“	1774
Simmons, Robert	Villisca	By examination	1795
Schadt, Conrad	Amana	“	1797
Siemers, John	Onslow	Without exam.	1813
Shotts, J. F	North English	“	1817
Stong, Jacob	Kilbourne	“	1821
Stansburry, Grant S	Dean	“	1840
Sherman, Chas. R	Anita	By examination	1861
Sommerbeck, R	Cedar Rapids	“	1865
Salmon, E. J	West Point	“	1871
Speers, Geo. W	Vinton	“	1888
McStewart, Chas	Centerville	“	1893
Shultz, Will J	Creston	“	1898
Sherman, Jno	Anita	“	1907
Stilliams, W. C	Clarinda	“	1914
Smith, E. J	Dexter	“	1919
Scar, Geo. P	Griswold	“	1933
Schafer, Geo. H	Fort Madison	“	1940
Slocum, Eugene	Rose Hill	Without exam.	1958
Smith, Howard B	Corning	“	1959
Stearns, T. C	Alpha, Bethel P. O.	“	1965
Stever, David H	Fairfield	By examination	1992

ABSTRACT—Continued.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Saunders, Wm. J	Bevington	By examination	1999
Smith, Chas	Sanborn	"	2004
Shaffer, Lewis O	Altoona	"	2015
Stevens, Emma T. A	La Fayette	Without exam.	2023
Slater, G. W	Garrison	"	2039
Sperry, Lewis B	Hamburg	By examination	2064
Sweester, W. W	Storm Lake	"	2069
Swartz, Jno. L	Iowa Falls	"	2070
Salisbury, G. R	Lenox	"	2072
Sheriff, Chas. E	Davenport	"	2090
Steiner, Jno	Audubon	"	2091
Sager C. A	Promise City	"	2093
Stockton, Wm. M	Dubuque	Without exam.	2106
Smith, N. M	Peru	By examination	2118
Stevens, H. J	Shenandoah	"	2125
Schriever, Wm	Sigourney	"	2127
Spaulding, S. J	Milo	"	2129
Stuart, Geo. A	Weldon	"	2133
Strickler, B. E	Red Oak	"	2137
Selby, J. Milton	Carbon	"	2140
Stoll, L. S	Arcadia	"	2142
Schlumberger, Philip	Griswold	"	2144
Stutsmans, D. W	Bonaparte	Without exam.	2116
Sager, F. P	Afton	By examination	2153
Stevens, R. Appleton	Brandon	"	2169
Stevens, F. G	Sidney	"	2172
Sampson, J. W	Fairfield	"	2196
Selby, R. W	Carbon	"	2197
Slater, Dan'l	Stratford	"	2211
Schenk, Geo. W	Burlington	"	2230
Silverthorn, A. F	Creston	"	2231
Turtle, Will G	Mediapolis	Without exam.	30
Turtle, Fred. C	Mediapolis	"	32
Tomlinson, Mahlon	Salem	"	38
Trout, A. W	Quasqueton	"	148
Trullinger, W. B	Farragut	"	168
Tormann, Fred. G	Dubuque	"	227
Townley, Henry C	Allerton	"	250
Townley, R. D	Allerton	"	251
Templeton, H. M	Ames	"	263
Thormahlen Henry	Boone	"	293
Torrence, F. G	Birmingham	"	314
Talcott, J. S	Conway	"	397
Twining, I. L	Corning	"	398
Twining, E. T	Corning	"	399
Tremaine, Julius N	Creston	"	401
Toms, Jr., Geo. W	Marion	"	402
Torbett, W. H	Dubuque	"	421
Tapper, John G	Dayton	"	424
Trueblood, Jno	Earlham	"	498
Tomblin, Eugene S	Emerson	"	553
Therme, Jno. L	Farmington	"	574
Trimble, A. Y	Greene	"	598

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Teague, Albert E	Greenfield	Without exam.	625
Tabor, R. W	Independence	"	656
Tabor, P	Independence	"	657
Tabor, S. J. W	Independence	"	658
Tinsley, Jno. W	Exira	"	735
Tompson, Chas. H	Lemars	"	750
Tompson, E. M	Monticello	"	842
Truax, G	Maquoketa	"	860
Tabor, Edward O	Malcom	"	862
Thompson, Thos. W	Mason City	"	894
Truax, Chas. H	Maquoketa	"	913
Troy, Sam'l T	Nashua	"	938
Teale, Thos	Lamoni	"	970
Taylor, Richard A	Burlington	"	984
Taylor, Jas. L	Ottumwa	"	1001
Taylor, J. A	Ottumwa	"	1003
Taylor, Chas. O	Ottumwa	"	1005
Tapping, Chas. A	Richmond	"	1086
Freer, Jno. I	Red Oak	"	1096
Tathwell, Edwin	Martelle	"	1166
Thorp, Edward L	Shell Rock	"	1176
Treat, Joseph A	Stuart	"	1199
Todd, Geo. W	Shelby	"	1217
Toovey, William	Victor	"	1279
Teed, Geo. W	Webster City	"	1361
Thomas, Camp	Fort Madison	"	1427
Tormblom, A. L	Nevada	"	1432
Tipton, J. C	Elkader	"	1570
Ticknor, Fred S	Westerville	"	1591
Thomas, A. B	Gilbert's Station	"	1592
Tidrick, L. M	Winterset	"	1612
Tidrick, Geo. C	Des Moines	"	1613
Thompson, Jno. C	Ottumwa	By examination	1694
Thoma, Lewis	Fairfield	"	1703
Tower, Hannibal	Fort Atkinson	Without exam.	1733
Turner, J. S	Atalissa	"	1763
Tompson, A. M	Mason City	"	1828
Tiedmann, Julius F	Davenport	"	1778
Treat, Jas. A	Stuart	By examination	1783
Tripp, W. G	Charles City	Without exam.	1844
Thomas, Camp	Fort Madison	By examination	1851
Thompson, Thos. W	Mason City	"	1859
True, C. E	Avoca	"	1867
Tays, R. L	Braddyville	"	1883
Tidd, C. H	Geneva	"	1936
Tiarks, Herman	Monticello	"	1942
Townsend, A. R	Boone	Without exam.	1956
Teal, Cornelius	Ruthven	"	1969
Tobler, Chas. J	Dubuque	By examination	1991
Taylor, J. L	Fairbanks	"	2076
Toms, J. M	Marion	"	2119
Trotter, W. R	Newton	"	2124
Thompson, C. D	Liscomb	"	2159
Thompson, W. W	Luzerne	"	2223

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Tyler, L. G	Dunlap	By examination	2236
Throckmorton, Tom. M	Derby	"	2239
Udell, Adison S	Ottumwa	Without exam.	994
Underwood, T. I	Blanchard	"	1657
Urquhart, W. J	Burlington	By examination	1854
Utecht, P	Ottumwa	Without exam.	1944
Van Luevan, George M	Lime Springs	"	52
Van Meter, Jane G	Belle Plaine	"	294
Van Wagener, Eli	Corning	"	400
Vogt, William J	Dubuque	"	458
Voorhees, C. P	Villisca	"	494
Vogel, John R	Guttenberg	"	610
Van Werden, George W	Keokuk	"	694
Van Valkenburg, B. J	Earlville	"	718
Van Cise, Isaac P	Mt. Pleasant	"	827
Van Der Voort, J. H	Gilman	"	966
Van Der Voort, S. H. B	Gilman	"	967
Vittetoe, Hiram C	Harper	"	977
Vanderley, John	Osceola	"	1035
Van De Ven, H. J	Pella	"	1081
Van De Ven, H	Pella	"	1082
Van Sittert, William	Pella	"	1084
Vaughan, Charles W	Williams	"	1354
Van Evera, Wallace	Maquoketa	"	1406
Vincent, William A	Webster City	"	1470
Virden, A. E	Hillsboro	"	1623
Venstrand, Peter	Red Oak	By examination	1910
Van Ness, Isaac T	Minden	"	2047
Van Schaack, Cornelius Peter	Fort Madison	"	2175
Wade, William L	Breda	Without exam.	6
Woods, Josiah	Wiota	"	19
Webb, John B	De Witt	"	40
Wells, Lewis	Des Moines	"	43
Welch, A. C	Nugent's Grove	"	65
White, Wyllys P	Volga City	"	71
Widman, Philip	Marshall	"	75
Wolgamot, A. R	Fairbank	"	76
Waterman, G. F	Macedonia	"	92
White, Harva	Blanchard	"	141
Wolfe, D. L	West Point	"	154
Wallace, T. B	Morrison	"	155
Wills, D. H	Iconium	"	156
Weidner, S. S	Memory	"	174
West, Joseph D	Red Rock	"	180
Wilson, R. B	Rose Hill	"	201
Welsh, George H	Boone	"	208
Willits, J. H. V	Bangor	"	217
Welton, Hiram	Butlerville	"	225
Wailes, L. C	Steele (Tranquility)	"	235
Wegener, Joseph	Arcadia	"	252
Wilkin, R. D	Adair	"	257

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Watson, J. A	Atlantic	Without exam.	284
Wynkoop, B. B	Bellevue	"	298
Witt, Richard F	Clinton	"	362
Wellman, Z. A	Cherokee	"	403
Wise, Chas. A	Cedar Falls	"	404
Woodbury, Geo	Garden Grove	"	407
Woodbury, Gus J	Garden Grove	"	408
Williams, D. A	Council Bluffs	"	409
Wilson, L. L	Center Point	"	411
Wilson, G. L	Center Point	"	412
Walker, S. B	Calamus	"	415
Weaver, Chas. A	Des Moines	"	442
Wunderlich, Geo. W	Dubuque	"	450
Word, Jas. H	Bartlett	"	484
Weaver, Jno. A	Des Moines	"	496
Walker, Wm. A	Ainsworth	"	528
Watterbury, S. E	Fayette	"	532
Wolfgang, Albert J	Emmetsburg	"	556
Williams, Thos. J	Eddyville	"	565
Whitley, Lyman	Fulton	"	579
Ward, Jessie A	Fairbank	"	583
Ward, Jos. A	Gilman	"	606
Ward, Wm. J	Gilman	"	607
Whitney, Erwin F	Grinnell	"	623
Williamson, W. R	Hopkinton	"	630
Walters, Sam'l H	Harlan	"	631
Worth. Fordyce	Hesper	"	632
Way, Jas. R	Hillsdale	"	626
Wakefield, Jas. I	Spring Hill	"	659
Wallace, C. R	Independence	"	663
Wetherell, Frank D	Knoxville	"	674
Woodruff, M. W	Knoxville	"	675
Wilson, Robt. R	Keokuk	"	682
Wilkinson, A. J	Keota	"	689
Woodford, H. E	Morning Sun	"	693
Wright, Wm. M	Keota	"	698
Wright, Orson E	Big Rock	"	710
Wilson, Jno. F	Center Point	"	712
Wamberg, Jno. J	Decorah	"	717
Warner, Ichabod	Libertyville	"	752
Williams, Jas. C	Cromwell	"	788
Weiser, Emelius I	Decorah	"	799
Weller, Wm. L	Cedar Rapids	"	811
Wright, S. W	Centerville	"	816
Willsey, Alamando	Monroe	"	824
Wright, Henry M	Morning Sun	"	851
Wood, Annie L	McGregor	"	881
Williams, E. J	Mapleton	"	882
Ward, Thos	Montrose	"	886
Williamson, Elisha T	Montrose	"	887
Wood, Geo. C	MGregor	"	904
Wilcox, C. D	Maquoketa	"	906
Weaver, Almerin R	Chapin	"	927
Weaver, Sylvester P	Chapin	"	928

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Mulfsberg, O. R	Northwood	Without exam.	946
Wilson, O. R	Northwood	"	945
Wilson, Frank R	New London	"	954
Ward, Chas. H	Des Moines	"	979
Ward, Milo W	Des Moines	"	980
Wheaton, M. S	Hazleton	"	986
Wilson, Archie C	Oelwein	"	1012
Walker, M. K	Otley	"	1022
Wills, Will A	Oskaloosa	"	1039
Willis, Arthur E	Perry	"	1047
Weaver, Cyrus A	Perry	"	1048
Wilson, Jas. B	Randolph	"	1092
Wyant, Eli M	Cedar Falls	"	1113
Wick, Rollin E	Cedar Falls	"	1121
Winchester, S. G	Eldora	"	1139
Whistler, Levi	Harper	"	1145
Williams, Edward B	Strawberry Point	"	1184
Waite, R. H	Steamboat Rock	"	1219
Webster, Jos. C	Shenandoah	"	1241
Warren, Thos. E	Tama City	"	1251
Wooley, Erastus M	Traer	"	1262
Williams, David M	Tabor	"	1263
Wyman, J. H	Unionville	"	1268
Withrow, Wm. H	Woodbine	"	1310
Wiard, W. F	Walnut	"	1314
Walters, Jerry	Walnut	"	1315
Williams, W. L	Walnut	"	1316
White, Fred. W	West Union	"	1322
Wangler, Conrad D	Waterloo	"	1338
Wangler, R. C	Waterloo	"	1339
Wintrode, John H	Winterset	"	1346
White, Albert K	West Union	"	1321
Witte, Jno. H	Burlington	"	1372
Warren, Alfred	Casey	"	1378
Ward, Francis E	Greeley	"	1393
Will, Geo	Marshalltown	"	1408
Warner, Mellville O	Manchester	"	1412
Wells, Charley L	Oskaloosa	"	1416
Williams, Frank I	St. Ansgar	"	1425
Weber, Henry G	Atlantic	"	1436
Wonnenberg, Otto C	Independence	"	1442
Werthmueller, Geo	Burlington	"	1449
Ward, Elizabeth E	Greeley	"	1451
Whetstone, John H	Iowa City	"	1508
Waynick, Wyatt W	Chariton	"	1519
Waynick, Hannah J	Chariton	"	1520
West, Alex. M	Carlisle	"	1526
Williams, C. A	Mooreville	"	1533
Wiese, Henry P	Burlington	"	1537
Wood, Thos. W	McGregor	"	1551
Walker, Jno. T	Ida Grove	"	1553
Wigert, Carl R	Burlington	"	1565
Walsh, John	Raymond	"	1593
Wilson, J. C	New Virginia	"	1594

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Wilson, J. H	New Virginia	Without exam.	1595
Walsh, E. E	Raymond	"	1610
Wall, Thos. M	Sheldon	"	1618
Weeks, A. J	Correctionville	"	1624
Weeks, J. E	Correctionville	"	1625
White, Perry G	Lime Springs	"	1652
Walterscheidt, Chas	Carroll City	By examination	1671
Wells, Willis C	Fairfield	"	1683
Wheeler, J. M	Hillsdale	"	1707
Way, L. H	Pattersonville	Without exam.	1735
Wilson, Geo. W	Tipton	"	1745
Wakefield, T. J	Griswold	"	1749
Weeler, J. C	Knoxville	"	1753
Walter, J. D	Darwin	"	1758
Whiteside, Jno. H	Reno	"	1761
Wright, B. A	Rock Falls	"	1764
Walker, J. H	Quincy	"	1766
Webb, N. H	Hesper	"	1767
Wilson, J. N	Sumner	"	1771
Wright, Geo. J	Waubeck	"	1777
Woodford, C. W	Yarmouth	"	1779
Wuest, Albert	Tripoli	By examination	1796
Whitaker, Wm. H	Le Claire	Without exam.	1806
Welles, Jno. S	Riceville	"	1825
Webber, C. J	Cresco	"	1827
Wheat, J. G	Callanan	"	1829
White, Wyllys P	Volga City	By examination	1857
Wiebenson, Ed J. L	Gladbrook	"	1900
Wolfgang, W. E	Emmetsburg	"	1908
Wheeler, Geo. E	Cedar Rapids	"	1912
Westveer, Henry	Anamosa	"	1918
Wilson, Archie C	Olewein	"	1930
Woodbridge, M. L	Nashua	"	1937
Weaver, Chas. A	Des Moines	"	1938
Weaver, Eli	Des Moines	Without exam.	1960
Waight, Wm. F	Lenox	"	1972
Westbrook, W. H	Lyons	By examination	1984
Wolf, Horace G	Jessup	"	1986
Wride, Theodore	Dennison	Without exam.	2025
Watkins, Thos. J	Lineville	By examination	2077
Widener, Wm. W	Sioux Rapids	"	2089
Westbrook, E. M	Breda	"	2092
Wood, Dexter L	Strawberry Point	"	2094
Wood, W. W	Des Moines	"	2104
Wittimer, J. W	Dubuque	Without exam.	2105
Welch, Jas. W	Belle Plaine	"	2110
Warren, Henry V	Marion	By examination	2145
Wilkins, Geo. S	Delta	"	2146
Wheeler, Welles	Dunlap	"	2151
Webber, Chas. J	Cresco	"	2171
Warner, M. O	Fort Madison	"	2185
Wright, W. M	Keota	"	2203
Westbrook, C. H	Arcadia	"	2207
Waight, Wm. F	Lenox	"	2222

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Young, W. N	Council Bluffs	Without exam.	344
Young, W. B	Knoxville	"	805
Young, O. P	Knoxville	"	806
Young, B. F	Manson	"	855
Yetter, Dan'l M	West Branch	"	1460
Yount, Chas E	Colfax	"	1560
Young, Jas. G	Knoxville	"	1567
Young, C. C	Spring Hill	"	1600
Young, Will G	Dexter	By examination	1993
Zimmerman, D	Reasnor	Without exam.	109
Zern, S. D	Corydon	"	413
Zieppreeht, H	Dubuque	"	1382
Zieppreeht, Conrad	Dubuque	"	1384
Zeisig, Chas. A	Moscow	"	1647
Zoller, Harry S	Otranto Station	"	1715
Zimmerman, J. W	Creston	By examination	2157

NOTE—The following names were incorrectly transcribed, and are here given as they appear on the Register:

Freer, John I., Red Oak, No. 1096; McStewart, Charles, Centerville, No. 1893; Mulfsberg, O. R., Northwood, No. 946; Mueller, Geo. Werth, Burlington, No. 1449.

ERRATA.

The following list of names was entirely omitted in transcribing the Register, and was not discovered until the whole of the report was printed

GEO. H. SCHAFER.

ABSTRACT—CONTINUED.

NAMES.	ADDRESS.	HOW REGISTERED.	No. of certificate.
Ong, Finley M	Wapello	Without exam.	116
Olney, Arthur R	Clinton	"	374
Oeder, Frederick	Des Moines	"	420
Olds, Gamaliel W	Lone Tree	"	490
Oleson, Martin	Ft. Dodge	"	581
Oleson, Olaf M	Ft. Dodge	"	585
Ockerman, Daniel R	Lineville	"	758
Orcutt, Geo. B	Maquoketa	"	861
Olmstead, Earl N	New Hampton	"	951
Owens, J. B	Bedford	"	962
O'Conner, J. C	Melrose	"	971
Ormiston, J. S	Chelsea	"	1118
Oehl, Jno. E	Charles City	"	1123
Odiorne, E. M	Indianola	"	1148
Owen, Luther	Marion	"	1162
Otis, Clarence M	Tabor	"	1264
Orris, Wm. W	Victor	"	1276
Oberman, Adolph	Burlington	"	1373
Osborn, Benj	Rippey	"	1462
Olive, Richard	Scranton	"	1465
Olive Edwin A	Scranton	"	1466
Opperman, Henry	Jessup	"	1471
Otrondonsky, Joseph	Iowa City	"	1528
Olds, Benj. R	Cherokee	By examination	1674
Osier, J. W	Green	Without exam.	1727
Oleson, Olaf M	Ft. Dodge	By examination	1939
Ottens, J. H	Andrew	Without exam.	248
Owens, N. Eugene	Oskaloosa	By examination	1980
Ott, Daniel W	River Side	Without exam.	1081
O'Conner, Felix H	Keokuk	"	681
Oren, Samuel A	Mt. Auburn	"	2112
Oldbridge, W. V	Farley	By examination	2233

FIRST BIENNIAL REPORT

OF THE

STATE MINE INSPECTOR

TO THE

GOVERNOR

OF THE

STATE OF IOWA,

FOR THE YEARS 1880 AND 1881.

DES MOINES:
F. M. MILLS, STATE PRINTER.
1882.

FIRST ANNUAL REPORT

OF

PARK C. WILSON,

STATE MINE INSPECTOR,

FROM AUG. 18, 1880, TO JAN. 1, 1881.

REPORT.

INTRODUCTION.

DES MOINES, IOWA, December 26, 1880.

To HIS EXCELLENCY, JOHN H. GEAR, *Governor of Iowa:*

IN accordance with chapter two hundred and two, of the laws of the Eighteenth General Assembly, I herewith submit to you my first annual report as State Mine Inspector.

Pursuant to your appointment, I repaired to the capital on the 27th day of July, 1880, and entered immediately upon the duties of my office.

As you are well aware this was the first introduction of the State mining law. It was necessary to have a scientific test for the air and some little time was consumed in getting the instruments necessary for the discharge of my duties, and it was not until the 18th of August that I commenced the actual work of

INSPECTION.

At that time of the year there were a great many mines not working, and some that were, employing only a few men, that usually have a large number at work.

On account of the scarcity of miners in the State in the fall and the early part of the winter, some of the counties will not be reported very extensively in the report, because after I have once visited a county I have not had time to make a second visit.

As the law does not apply to, or affect, any coal mine in which not more than fifteen persons are employed at one time, many mines which I have visited I have not recorded, because of less than such mininum number of men being at work at the time of my visit.

It is customary for mine inspectors to give suggestions in regard to the future development of our coal beds, and also upon the coal strata of the State; but the limited time at my disposal has not permitted me to make many observations on anything besides the condition and inside workings of the different mines I have visited.

MAHASKA COUNTY.

As before stated, I commenced my tour of inspection August 18. I began work in Mahaska county. There were six mines at that time in the county that were employing fifteen men each. The Consolidation Coal Company (three), the Excelsior Coal Company, the Iowa Coal Company and the Oskaloosa Coal Company. Mine Number Three, of the Consolidation Coal Company, was the first one visited. This mine is situated on the Central Iowa Railway, and is opened by a drift on the south side of the Little Muchakinock Creek. The opening (or pit mouth) is ten or fifeeen feet above the bed of the creek, gradually dipping, as it penetrates the hills, for a distance of seventy-five yards, where the level of the coal-bed is reached. This mine has been in operation about six years, and all the front part of the hill is wrought out, with the exception of one entry on the right, where the pump-shaft and man-way are situated. This mine is worked on the room-and-pillar plan, as almost all of the mines are, with slight variations, and a description of one mine will answer for all that are worked on the same plan. In the mine, double entries are driven, and at the time of my visit only two were being worked, those at the right hand. These two were driven eighteen feet apart, leaving eighteen feet of coal between them, and the rooms were turned off the entries in opposite directions, those on the first right turning to the right, and those on the second right turning to the left. The rooms are driven seven feet wide until they reach a distance of ten feet from the entry, when they widen out to twenty feet, the full width allowed, leaving ten feet of coal between the rooms to support the roof, while driving up the room. When the room is driven the distance of seventy-five yards, the pillar is attacked and brought back toward the room mouth, letting the roof fall. The company had just put in machinery for handling the coal using a single rope, the empty cars pulling the rope back into the mine and to the bottom of the slope. Thence a mule pulls the cars with the rope attached, back to the first station, a distance of four hundred yards. Just back of this station, there are four entries turned off the main entry, two to the right and two to the left. Mules haul the coal to the station where the trains are made up. Six cars only are allowed to be taken out at once by the engine.

The drag is fastened to the last car, and the man in charge of the train rides on the drag. The coal is taken by the mules from the face of the rooms where the miners are working, the coal being high enough to admit of the mules going anywhere throughout the mines where the men are at work. At the time ninety-five miners, eight drivers, and eight mules were employed inside the mine. The capacity of the mine is three hundred tons per day, the length of the main entry five hundred and sixty-three yards, with four cross entries; the length of the two right entries is two hundred and eighty yards each, and the left hand entries are one hundred and forty-five yards each, measuring from the main entry.

The air-ways are five and half feet in height and seven feet wide. The mine is ventilated by a furnace of forty-eight cubic feet capacity, and and an air-shaft one hundred and two feet in height. The air is carried in one continuous current around the mine. Its full volume was eleven thousand two hundred and seventy cubic feet per minute; there were thirty-eight working rooms in the mine. The gauge of track is three feet one inch, the capacity of the mine-cars one ton each, and the the distance of air-shaft from mouth of slope four hundred and twelve yards. The escape-shaft is three hundred yards from the mine opening, and is located on the west side of the main entry. The mine was in good condition in every respect and the outside workings were in good repair. T iron tracking is used in all of the entries. The east entries had run into a fault, and by drilling down from the surface fifty yards ahead of the entries, it was found that the coal had cropped out, and the entries were stopped. The main entry rises gradually from the station from which the engine pulls the coal until the coal was only about three and a half feet thick, and proved to be the same fault that had been met with in the east entries so the main entries were stopped and two entries were turned to the right and had been driven only a short distance when the workmen drove through the fault and found coal again. There is considerable gas in the mine on account of so much powder being used and they are troubled considerably with gob-fires, which require close attention. The waste, which the miners throw back sometimes heats, and often has to be loaded into cars and taken out of the mines. Mine Number One, belonging to the same company is situated on the same creek, about half a mile lower down. It is also a drift opening and worked on the same plan, but it is a larger mine. It is been in operation about seven years, some of the time shipping as high as five hundred tons per day. The main entry is seven hündred and eighty-five yards in length, with six cross entries in operation. The first and second north are two hundred and sixty yards in length, the others are not driven so far. Rooms are turned and being worked on all the entries. The cross entries turn square off the main entries, and the rooms turn square off the cross entries, measuring thirty feet to the room. The rooms are turned as before described.

Steam power is employed in the mine for hauling the coal, a thirty-two horse-power double engine, with endless rope being used. The manner of ventilating this mine is by means of a furnace, the air passing into the mine at the mouth of the drift and traveling along the main entry until it reached a point just back of the wheel on which the rope works. There was a door hung on the main entry turning the air into an air course running parallel with the main entry until it reached the first north entry. There was a door to keep the air from returning on the main entry and another door further up the first north to turn the air into the rooms. From where the air left the main entry until it reached the first north was about one hundred and fifty yards, with a brattice every twenty yards that was leaking air so that by the time we reached the back of the first north there was no current of air, or at least it was so small that the air meter would not record any. Thence through the rest of the mine there was no current of air even on the entries except what was caused by the driver with his mule passing along the entry with the car.

After I had gone all through the mine, I told the foreman that I expected him to comply with the mining law; and that the law gave him twenty days to air the mine properly or he would have to cut the force down to ten men. I requested him to change the mode of carrying the air. Instead of turning the air off the main entry as before described, I requested him to take off the door on the main entry and let the air travel on it until it came to first entries, and turn it into them and conduct it around the mine in that way, putting in an overcast over the main entry. Thus the men would get pure air, and all the leakage of carbonic acid gas from the old works would be carried away from the men; when as by the other mode the air traveling by the old works carried all the foul air from the old workings to the men.

The furnace is situated on the right side of the mine, some three hundred yards from the main entry, at the end of a cross entry. The coal is all worked out on this cross entry, except close to the furnace, but the entry is well timbered. The air-shaft is six feet four inches in diameter, and sixty feet high. The furnace has a capacity of twenty-two cubic feet, is situated thirty feet from the bottom of the air-shaft, and is seven hundred and eighty-three yards from the mouth of the mine. The man-way is also situated on this entry with good ladders for the men to escape by, in case of accident. The escape-shaft is four feet in diameter. Ninety-eight miners were employed but more men were being added to the force. The capacity of the mine at that time was three hundred and fifty tons per day. The air-ways are all driven seven feet wide, and the full height of the coal, which is six feet. All of the entries are timbered, the roof in the mine is good.

I again visited this mine in twenty-five days from the date of the former inspection, and found the changes recommended had been made. On testing, I found over six thousand cubic feet of air per minute in places where there was no current on the first inspection.

The outside workings of the mine are in good condition. The mine water is pumped out of the mines with an eight horse-power engine, using an elevator pump, lifting the water up a shaft one hundred and twenty-seven feet, with an endless rope running from the pumping engine half a mile to another water-shaft belonging to Number Three, and hoisting the water from the mine with the same kind of pump.

October 11th, I visited the Eureka Mine, belonging to the Consolidation Coal Company at Beacon. This mine is operated by a shaft using steam power, with wire rope for hoisting the coal. The mine is worked on the room-and-pillar, with single entries. The coal is weighed on railroad scales after being screened. At the time of my visit the mine was employing forty-eight miners, four mules, and four drivers. The capacity of the mine was two hundred and sixty tons per day. The length of the main entry is one thousand feet with eight cross entries, driven one hundred yards apart, the air-ways passing through the rooms. The mine is ventilated by a furnace of twenty-five cubic feet capacity. The air-shaft was four and one-half feet in diameter, and ninety-five feet in height. There were sixty working rooms in the mines. The gauge of track is three feet, the capacity of the mine cars one ton, the distance of the air-shaft from hoisting-shaft one hundred and twenty feet, and the size of the escape-shaft four feet square. This mine was in poor condition. There were no covers on the cages, no brakes on the drum, and no air in circulation in the mine. There were very few rooms in the mine fit for a man to work in. The air-ways in places were almost full of slate and refuse from the mine, so that what air there was in the mine was loaded with gas until it was not fit to breathe. The bottom of the air-shaft, back of the furnace, was almost full of dirt and slate which had fallen down the air-shaft. The air-shaft is not timbered. Some of the rooms had fallen in, and there was no way for the air to circulate through the mines to the eastern part until an air-way was driven around those rooms that had fallen in, at which men were working when I was there. Men were driving both ways, and it was thought they would get it done in a short time. I notified the superintendent of the condition of his mine, requesting covers put on the cages, gates on the landings, and a brake on the drum, the air-shaft and the air-ways cleaned out, and ladders put in the escape-shaft. The miners have since reported to me that the air in the mine is good. Being called upon to visit other places so that my time has been occupied, I have not visited this mine a second time.

The Iowa Coal Company's Mine is also situated at Beacon, C. L. Williams, of Keokuk, president; Simon Phillips, of Beacon, superintendent. The company has a capital invested of one hundred thousand dollars. The mine is operated by a shaft, using steam power, with wire rope for hoisting purposes. The mine is worked with double entries. The coal is weighed on railroad scales after being screened. Fifty miners, five mules, and five drivers were employed in the mine. The capacity of the mine was one hundred and fifty tons per day, and the length of the main entry seventeen hundred and twenty-eight feet. I did not get the measurement of the cross entries, for the maps were not made up. The height of air-courses was six feet; the width the same, and the full volume of air nineteen thousand two hundred and thirty-six cubic feet per minute. The mine is ventilated by a furnace of twenty-five cubic feet capacity, with an air-shaft five feet in diameter, and fifty-five feet in height. There were one hundred working rooms. The gauge of track was two feet nine inches, and the capacity of the mine cars, one ton each. The air-shaft is fifty feet from hoisting shaft. The escape is by an old slope where the men can walk out of the mine in case of an accident. This mine is in good condition with the exception of covers on the cages, and a brake on the drum. I notified the superintendent to put a brake on the drum and covers on cages, and to have the maps made up.

The Oskaloosa Coal Company's Mine is on the Chicago, Rock Island & Pacific Railroad, two miles west of Oskaloosa, John Burdess, president. The capital invested is twenty thousand dollars. The mine is operated by a slope using steam power, with single rope, the empty cars pulling the rope back into the mine to the first station. The mine is worked with single entries. The rooms are turned off both sides of the entry, and the air is carried through the rooms. The coal is weighed on railroad scales, after being screened. There were twenty-six miners employed, two mules and two drivers. The capacity of the mine was sixty-five tons per day. The length of the main entry three hundred and forty yards, with four cross entries driven one hundred yards apart. The entries are four feet six inches in height and six feet wide. The full volume of air is six thousand four hundred and twenty cubic feet per minute. Ventilation is by means of a furnace of nine cubic feet capacity, with an air-shaft four feet in diameter and sixty-six feet high. The mine had forty working rooms, with a gauge of track two feet ten inches. The capacity of the mine cars twelve hundred pounds each. The distance of air-shaft from mouth of slope was two hundred and ten yards. There is no way for the men to escape in case of accident except at the slope mouth. Sufficient air was traveling through the air-ways, but at some of the working places there was no circulation. I notified the superintendent of the condition of the mine, requesting him to provide an escape for the men, also to hang doors on the entries to force the air into the face of the rooms, and to make maps of the mine. The outside workings were in good repair.

The Excelsior Mine is located two and one-half miles south of Oskaloosa on the Central Iowa Railway, S. S. Merrill, president, and W. A. Durfee (of Oskaloosa), superintendent. A capital of eighty thousand dollars is invested. The mine is operated by a shaft, using steam power to hoist the coal. There is also an engine to run the fan, one boiler furnishing the steam for both engines. The mine is worked with double entries. The coal is weighed on railroad scales after being screened. One hundred and thirty miners were employed. The capacity of the mine was five hundred tons per day. The length of the main entry was fifteen hundred and ninety feet with twelve cross entries. The full volume of air is seventy thousand cubic feet of air per minute; the air is divided at the bottom of the shaft and carried in different currents throughout the mines, giving each portion of the mine its proper amount of air. The mine is ventilated by means of a fan ten feet in diameter, run at ninety revolutions per minute. The air-shaft is eight feet in diameter and seventy-five feet high. The distance of the air-shaft from hoisting shaft is thirty-five feet. The escape shaft is eight feet in diameter, and situated fifty feet from the hoisting shaft. There were ninety working rooms in the mine, with a gauge of track of three feet. The mine was in good condition, with a strong current of air traveling all through the mine. The outside workings were in extra good condition, with the exception of covers on the cages, and these have since been put on.

MONROE COUNTY.

Coalfield Mine is situated in Monroe county on the Central Iowa Railway. It is owned by the Consolidation Coal Company. This mine is operated by a drift, and has been in operation three or four years; but the old works are all abandoned, and new ones are now being opened out with double entries, making the mine almost the same as a new one. Thirty miners were employed at the time of my visit, and the miners had good air within a reasonable distance of their working places. The coal is about four feet in height on an average. The miner mines the coal and then blasts it down with powder, firing only twice a day, and by the time the men get back after dinner the smoke is all gone. The mine is ventilated by means of a furnace of twenty cubic feet capacity, with an air-shaft three feet in diameter and eighty-six feet high. The capacity of the mine was one hundred tons per day. The coal is weighed on railroad scales after being screened. In this mine a wooden track is used with flat car-wheel and wooden guide on inside of the track. The coal is hauled by mule power from the back of the mine to the top of the dump. There were no ladders in the escape-shaft when I was there, but I requested the foreman to have them put in as soon as possible.

Hickory Grove Mine is situated on the same railroad, four miles farther up the creek (both this and the last mentioned mine being situated on Miller's Creek). It is operated with a shaft. The officers are A. Hicks, president; Martin Hicks, superintendent, both of Hickory Grove; and H. W. Gleason, of Oskaloosa, vice-president. The shaft is eighty feet deep and there is a forty horse-power engine for hoisting the coal. This mine is worked with room-and-pillar. At the time of my visit twenty-six miners were employed. The length of the main entry was two hundred and fifty yards with six cross entries. The cross entries were driven, some, sixty yards apart, and some, one hundred. Two of the entries were one hundred and forty yards in length, two were eighty yards and the other two were just started. The entries were driven twelve feet wide, and the height of the coal, which is five feet. The mine is aired with a fan seven feet in diameter and three and one-half feet in width. The air is carried in one current around the mine. There was a good current passing but the miners fire the blasts at all times in the day. For this reason the air was loaded with powder smoke. The volume of air was equal to one hundred and twenty-five cubic feet per man per minute, but the first man in the air fared better than the last. I recommended the men to pass a law regulating their firing, but they said they could not make coal enough by firing twice a day and for that reason they would rather have the smoke, and be allowed to fire at will. The capacity of the mine was three hundred and seventy-five tons per day. The coal is weighed on railroad scales. The air-shaft is five feet in diameter and eighty feet high and is situated eighteen yards from the hoisting shaft. This mine has an escape-shaft for the men, which the company has a right to be proud of. It is eight feet in diameter inside the timbers, with winding stairs commencing at the bottom and making eleven circles in reaching the top. The men use this altogether for going into and coming out of the mine. No one is allowed to ride on the cages, hence covers on them are unnecessary.

POLK COUNTY.

The next mine visited was the Pioneer Coal Company's Mine, Wesley Redhead, president, James P. Clark, superintendent, both of Des Moines. There is a capital invested at this shaft of fifteen thousand dollars, using steam power for hoisting the coal. The mine is worked with room-and-pillar. The main entry is nine hundred and thirty-three yards in length, with two cross entries. Here were employed twenty-one miners. This mine has been in operation for several years and has considerable territory wrought out. The air-shaft is two hundred yards from the hoisting-shaft. The hoisting-shaft is the downcast for the air, which has to travel nine hundred and thirty-three yards before it gets to the cross entries where the men are working, and then travel the same distance back to the upcast. The coal being soft, the entry pillars were crushed from the weight of the roof settling on them, until there was a leakage of over four thousand cubic feet of air before it got to the men; but at the time of my visit there was sufficient air for the amount of men employed. The air-shaft is five feet in diameter, and one hundred and sixty-seven feet in height. The capacity of the furnace is twenty-five cubic feet. This mine at one time extended from the north from the shaft passing under 'Coon River, but the coal got too thin to work, and that part of the mine was abandoned. The present workings of the mine are in bad condition. The foreman gave as a reason that the mine was just recovering from the effects of a strike which had laid it idle for some time. The curtains and doors on the entries were in bad condition, and were of no benefit for what they were intended for. The air-ways in places had considerable slate and refuse in them, and the cross-cuts from one entry to another were too small to admit of the proper amount of air passing through them. I requested the boss to take the curtains off the entries, and hang doors in their places, to fix up the doors that he already had so they would not leak so much air, to clear up the refuse from the air-ways, and to have the break-throughs made larger all through the mine.

The Polk County Mine belongs to the same company, Wesley Redhead, president; Daniel Rees, superintendent. There is a capital invested of six thousand dollars. The mine is operated by a shaft using steam power, with hemp rope for hoisting. The mine is worked with room-and-pillar. It was employing twenty miners. The capacity of the mine was forty tons per day. The length of the main entry is four hundred yards, with the cross entries driven five hundred feet apart and seven feet wide. This mine is in good condition at the present time, considering the way the mine had been opened. At the time this company took charge of it, it was all on fire, and it was impossible to get any distance from the bottom of the shaft; but Mr. Rees, the present foreman, went to work, and by erecting board brattices to carry the air, finally succeeded in building brick and sand stoppings, and thus subdued the fire. The man in charge of the mine when it was first opened did not understand that kind of work, and was opening the mine without any system, and when the fire broke out he could do nothing with it. Now the mine is in fair condition, with double entries driven seven feet wide and five feet high. The mine is ventilated by means of a furnace of thirty-six cubic feet capacity. The air-shaft is five feet in diameter and one hundred and five feet high. The current of air was over one hundred cubic feet per man per minute. The escape-shaft is two and one-half feet by five, with stairs, all complete.

The officers of the Eclipse Coal and Mining Company are S. S. Ethridge, Thomas Beck and J. L. Englebert, all of Des Moines. This company has a capital invested of fifty thousand dollars. The mine is opened with a shaft, using steam power for hoisting the coal. The mine is worked with room-and-pillar, with double entries seven feet wide and five and one-half feet high. The company was employing twenty miners, two drivers and two mules. The capacity of the mine was fifty tons per day. The length of the main entry is eleven hundred feet, with four cross entries one hundred and twenty yards apart. Three of the cross entries were driven three hundred yards from the main entries, and the fourth was driven one hundred yards; each entry driven double, with a velocity of air sufficient to give the men over one hundred and twenty cubic feet of air per man per minute. The mine is ventilated by means of a furnace of forty-eight cubic feet capacity. The air-shaft is five feet in diameter and seventy-five feet in height. There were fifty working rooms, with a gauge of track of three feet. The capacity of the mining cars was twelve hundred pounds each. The air-shaft is situated fifty feet from the working-shaft. The size of the escape-shaft is five by ten feet. I found the doors in the mine considerably out of repair, and the brattices were leaking considerable air, but the same reason was given which the other foreman gave, that while the men were on the strike repairs had been neglected. Men were now employed at general repair work inside the mine, and if the improvements are made which the foreman told me were intended, the mine will be in good condition.

The Eureka Mine is situated on the south side of 'Coon River, just at the foot of the hill, Norman Haskins, president; James Cormac, superintendent, both of Des Moines. A capital of twenty-five thousand dollars is invested. The mine is opened with a shaft using steam power. The mine is worked with double entries. At the time of my visit was employing sixteen miners, one driver, and one mule. The coal is weighed on railroad scales after being screened. The capacity of the mine was fifteen tons per day. The length of the main entry is one thousand and eighty feet, driven eight feet wide and five feet high, with four cross entries. The length of the first and second east is four hundred and eighty feet, the first west is three hundred and sixty feet, and the second west is seven hundred and twenty, with air-ways driven parallel with entries. The full volume of air was five thousand five hundred and twenty cubic feet per minute. The mine is ventilated by means of a furnace of eighteen cubic feet capacity, with an air-shaft four feet by five, one hundred and twenty feet high. There were twenty-two working rooms, with a gauge of track of three feet. The capacity of mine cars was twelve hundred pounds each, and the distance of the air-shaft from hoisting-shaft three hundred and seventy-two feet. The escape-shaft is situated close to the furnace-shaft, and is of the same size. The mine was in good condition, but I suggested to the foreman to have his break-throughs made larger between the entries, which he gave orders to have done. On November 27th there were complaints made to me that the air in the Eureka Mine was not good, and I was desired to come and look after it. I went to the mine and tested the full volume of air, which was ten thousand three hundred cubic feet, almost double what it was when I first visited the mine; but on examination, I found that in dividing or splitting the air there were nineteen hundred and twenty cubic feet of air per minute on one divide where eighteen men were employed, while on the other, where there were forty-six men employed, there were eight thousand four hundred cubic feet per minute. I also found rooms with break-throughs too small to admit the air to pass through, which the miners said was their fault, as the company had never restricted them in making the break-throughs. Some had been large enough, but had been almost filled up again. The main trouble, however, was on the first right entry, and where the complaints came from; there were two rooms on that entry that had no break-through between them, and both parties refused to make one. I told them that the air was there for them, and whenever they made a place for the air to get to them, it would go there, but it was not for me to decide who should make the break-through, as it was none of my business who made it, so that it was done. I requested the boss to hang some doors on the entries, and to have the break-throughs in dispute put through immediately. I have heard nothing of the complaint since.

MARION COUNTY.

The mine of J. T. James & Co. is situated on the Chicago, Rock Island & Pacific Railway at Knoxville, Marion county, where they are operating a shaft, with a capital invested of five thousand dollars, using a two-horse gin for hoisting the coal. This mine is worked with room-and-pillar. The cross entries are driven twenty feet wide, with two walls of slate built five feet from each rib. The space betwen these walls is filled with slate and refuse from the coal; in this way two entries are got, carrying the air up one side of this wall and down on the other. The coal is weighed on railroad scales after being screened. There were nineteen miners, one mule and one driver employed in the mine. The capacity of the mine is one hundred and fifty tons per day; the length of main entry one hundred and seventy-five yards, with four cross entries driven one hundred yards apart; the length of the first west entry is seventy-five yards, and of second west thirty yards; the height of entry four feet, the width six feet, and the full volume of air is seventeen hundred and seventy-six cubic feet. At the back of first west entry the air traveled ninety feet per minute, but on the second west there was no current of air. The doors had let all the air escape. The mine was ventilated by a stove placed at the bottom of the air-shaft. The stove was red hot, and I should think was doing all any stove could do placed in similar circumstances. The air-shaft is joined to the hoisting-shaft, and is two and one-half feet wide, six feet long and seventy-five feet high; the gauge of track is two feet eight inches, and the capacity of mine-cars, one thousand pounds each. The downcast-shaft is seventy-five yards from the hoisting-shaft, and is also used for an-escape shaft for the men. It is five by six feet. The hoisting-shaft was without gates on the landing, and there were no covers on the cages. I requested Mr. James to put in a furnace in place of the stove, to put covers on the cages, gates on the landing, and to have a map of the mine made. Work was begun the next day at the furnace and it was put in as soon as it could be done. I passed through there some time after when men were working on the gates, to make room for which, so that the gates would work, it was necessary to raise the roof of the dump.

The company has another shaft in operation a little west of the one before spoken of, but as it was working only eight men then, I did not go down into the mine. The company also has another mine close to Knoxville Junction, on the same railroad, but was working only a few men there, but it is in contemplation to work more as soon as the mine can be opened out enough to make room for miners. There is another mine in Knoxville known as the Gamble Mine, but as it was only working a few men it was not visited.

The Flagler Mine Number Five, belonging to the Union Coal and Mining Company, is situated on the Albia, Knoxville & Des Moines branch of the C., B. & Q. Railroad, about five miles south of Knoxville. The officers are J. C. Peasley, president, Burlington, and Samuel A. Flagler, superintendent, Ottumwa. It has a capital invested of twelve thousand dollars. The mine is opened by a drift, using mule power for hoisting the coal. The mules pull the coal direct from the mines, the coal being high enough for large mules to go anywhere in the mine. Some places are seven or eight feet high. The mine is all worked doubly entry. The coal is weighed on railroad scales after being screened. Forty miners, six drivers, and eight mules were employed. The capacity of the mine was one hundred and thirty tons per day. The length of the main entry is nine hundred and fifty, with seven cross entries, driven one hundred and twenty yards apart; the length of the first and second south entries was five hundred feet. First and second north entries are driven two hundred feet, and the first west entry three hundred and thirty feet, with air-ways driven parallel with entries; the width of air-ways is six feet, and the height five feet and a half. The full volume of air is eight thousand nine hundred and seventy-five cubic feet per minute. The mine is ventilated by a furnace of twenty-one cubic feet capacity, with an air-shaft six feet square, and one hundred and two feet high. There were twenty working rooms with a gauge of track of three feet. The capacity of the mine cars is one thousand pounds each. The air-shaft is three hundred and thirty yards from mouth of mine. The mine is without a man-way or escape-shaft, and was in rather bad condition. It had been lying idle for some time, and there were a great many falls in the air-ways; but the foreman, Harry Booth, had put on a force of men to clean out the air-ways, and they were working at it while I was there. There was a good current of air traveling on all of the entries, but nothing to force the air into the rooms. I requested the foreman to hang doors on the entries in order to force the air into the rooms where the men were at work, also to provide a way of escape for the men, and to have the maps made. He asked for some delay on the maps, as he had recently been put in charge of the mine, and his time was occupied inside constantly.

OAKHILL MINE.

I next inspected the Oakhill mine, George I. Butler, president, Mt. Pleasant; C. F. Stephens, superintendent, Knoxville. This mine is located on the same railroad about one half mile south of the Flagler Mine. A capital is here invested of twelve thousand dollars. The mine is opened by a drift using mule power. This, like the Flagler, has coal eight and nine feet thick. The mine is worked with double entries. The coal is weighed on small scales before being screened. Twenty-eight miners, two mules and two drivers were employed in the mine. The capacity of the mine is one hundred and twenty-five tons per day. The length of main entry is seven hundred and seventy-one feet, with six cross entries, the length of first and second east three hundred and thirty-two feet, third and fourth east one hundred and eighty-one feet, third and fourth west two hundred and thirty feet. The first and second west were wrought out. The entries are driven six feet high and twelve feet wide. This width is necessitated in order to make room in which to stow away the refuse of which there is a large quantity in this coal. The full volume of air was seven thousand and sixty-four feet per minute. The mine was ventilated by a furnace of eleven cubic feet capacity with an air-shaft four by six feet, and seventy-one feet high. The capacity of the mine cars is one thousand pounds each. The air-shaft is situated seven hundred and thirty-four feet from mouth of mine. There were two inlets for the air, one an old air-shaft; the other the drift mouth. The air that passes in at the mouth of the mine ventilates the east and back part of the mine while that which comes down the old air-shaft ventilates the west part of the mine, both currents meeting at the furnance. Ladders have since been put in the old shaft referred to, to be used as an escape for the men in case of accident. This mine has all the air traveling on the entries. I requested the boss to put doors on the entries to turn the air into the rooms, and make the breakthroughs larger between the entries.

JEFFERSON COUNTY.

WASHINGTON COAL COMPANY'S MINE.

On request I visited the Washington Coal Company's mine, of Pertre. William Elliot, president; W. E. Thompson, superintendent, both of Fairfield. The mine is located on the railroad seven miles north of Fairfield. There is a capital invested of twelve thousand dollars. The mine is opened by a shaft using a two-horse gin to hoist the coal. The mine is worked with single entries. The coal is weighed on small scales before being screened. At the time of this visit, forty-eight miners, two drivers, two mules, and three pushers were employed in the mine. The coal is too thin to admit of a mule going to the face; accordingly men are required to push coal from the miner to the entry, where the roof is blasted down to make height for a mule. The capacity of the mine is eighty-two tons per day. The length of the mine entry was one thousand three hundred and eighty feet and there are two cross entries four hundred feet in length, the height three feet and width of entries seven feet. The full volume of air was five thousand nine hundred and fifty-six cubic feet per minute. The mine was ventilated by means of a furnace of twenty-eight cubic feet capacity, with an air-shaft three feet nine inches in diameter and eighty-four feet high. There were twenty-eight working rooms. The gauge of track is two feet eight inches, and the capacity of the mine cars nine hundred pounds each. The air-shaft is sixty feet from hoisting-shaft. The mine was in poor condition on account of having no covers on the cages, no gates on the landing, no escape for the men aside from the hoisting-shaft and very poor ventilation. I notified the superintendent of the condition of his mine, but not hearing anything from the mine I again visited it October 29th and found it in about the same condition. The sinking of a shaft for the purposes of escape had been begun, but it was not finished. There were yet no covers on the cages, and the air in the back of the mine was not fit for men to work in. I gave the company its choice to reduce the number employed as the law directs, or I would have to reduce the force by law. The force was then voluntarily reduced and is in that condition at the present time. When the improvements are completed and the mine properly ventilated, the company is to advise me when I will again visit the mine and if the ventilation is good, their full force of men may again be set to work.

JEFFERSON COUNTY COAL COMPANY'S MINE.

The Jefferson County Coal Company's shaft is located about one mile east of Perlee, James F. Wilson, of Fairfield, president, and R. H. Herford, superintendent. Most of the coal from this mine is used by railroad engines. There is a capital of twenty thousand dollars invested. The mine is operated by a shaft, using steam for hoisting the coal. The mine is worked with double entries. The coal is weighed on small scales, before being screened. Seventeen miners, two mules and two drivers were employed. The capacity of the mine was forty tons per day. The length of main entry was five hundred feet, with two cross entries, the height of entries three and a half feet, and the width six feet. The mine was ventilated by building a fire in a basket at the bottom of the air-shaft. There were five working rooms with a gauge of track of three feet, and the capacity of the mine cars was one ton each. The distance of air-shaft from hoisting-shaft was four hundred feet. There were no gates on the upper landing, and there was no brake on the drum, and in what was used for an air-shaft. I could not, standing at the bottom, see out at the top, while the air-course at the bottom of the shaft had fallen in. Neither were there any maps of the mine. I gave the superintendent notice of the condition of his mine, and the improvements required. When I visited the Washington shaft the second time I also visited this mine. The brake had then been put on the drum and the gates on the landings, but there were no covers on the cages. Another shaft had been commenced and was sunk about half way to the coal. When complete it will be large enough, being seven feet in diameter. The air-course, before spoken of, was timbered up until the point was reached where it had fallen in, whence the men drove through the coal until they made connection with the air-course on the opposite side of the fall. The company, however, voluntarily reduced its force to twenty men, under the provisions of section nine of the mining law, the mine not having been in operation one year. The present foreman had had charge of this mine only about ten days before my first visit.

KEOKUK COUNTY.

STARR COAL COMPANY'S MINE.

The Starr Coal Company's Mine is situated at What Cheer, on the Burlington, Cedar Rapids & Northern Railroad, A. N. Foster, superintendent. There is a capital invested of thirty-three thousand dollars. This mine is operated by a shaft, using steam for hoisting the coal, and is worked with double entries. The coal is weighed on railroad scales after being screened. One hundred and ten miners, four mules and four drivers were employed. The capacity of the mine was four hundred tons per day. The length of main entry was seven hundred yards with eight cross entries; the height of the entries, six feet, and the width, nine feet, and the full volume of air, nine thousand five hundred and forty cubic feet per minute. The mine is ventilated by a steam jet at the bottom of the air-shaft. The air-shaft is three feet wide, four and a half feet long, and eighty-five feet high. There are eighty working rooms, with a gauge of track of three feet, and the capacity of the mine cars one ton each. The distance of air-shaft from hoisting-shaft is thirty-five feet. The mine is in good condition, with the exception of an escape-shaft and a brake on the drum. The air-ways are are driven large and of uniform size, and the doors and stoppings were in good condition. I tested the steam jet at its full capacity, and it gave eleven thousand one hundred and thirty cubic feet per minute. This mine requires a less amount of air per man any than other mine I have been in. There is very little waste in the coal, and consequently no gob in the rooms to accumulate gas. The coal is cut and mined on each rib, and very little powder is used. The outside workings were in good condition. The Starr Company is sinking another shaft one mile north of the one described, but had only a few men employed there. There were several other mines in this county which I went to see, but as none of these were working fifteen men, I did not go into them. Some of them are in bad condition.

APPANOOSE COUNTY.

CENTERVILLE COAL COMPANY'S MINES.

I next visited the Centerville Coal Company mines at Centerville, Appanoose county. William Bradley, John T. Henderson and D. A. Spooner constitute the company, and are its officers. It has two mines. The first visited was the Cobb Mine. A capital is here invested of twenty-five thousand dollars. The mine is operated by a shaft using a twelve horse-power steam engine for hoisting purposes. The coal is weighed on railroad scales after being screened. Twenty-eight miners, one driver, and two mules were employed in the mine. Its capacity was fifty tons per day. (I could not get the measurements as there were no maps of the mine.) The ventilation was by a steam jet at the bottom of the air-shaft, which is four feet wide, five long, and one hundred and seventy high. There were thirteen working rooms, with a gauge of track two feet six inches, and the capacity of the mine-cars of twelve hundred pounds. The air-shaft is joined to hoisting-shaft. The escape-shaft is situated at the extreme north part of the mine. It had once been a hoisting-shaft. This mine is in poor condition. There were no covers on the cages, no brake on the drum and no gates on the landings while the traveling-way leading to the escape-shaft was full of water. The mine was opened with single entries, and the air traveling through the old rooms became so loaded with gas that it was with difficulty I could carry a light in some of the working places. The air-way from the bottom of the air-shaft where the steam jet is has no connection with the works at the back of the mine, but comes out on the main entry about fifty yards from the hoisting-shaft. The hoisting-shaft is a downcast for the air, and so is the escape-shaft at the back of the mine, but the hoisting-shaft gives the steam jet its full capacity of air, and consequently there is no current from the back of the mine where the miners are at work. The main entry was in a dangerous condition on account of the way it was timbered. The shaft is sunk in a fault, and had to be driven about seventy-five yards before coal was reached.

The timbers in the entry through this fault were rotten, and some of them broken by the weight, and the entry was liable to close at any time. I gave the company notice of the condition of the mine and requested immediate attention. Next morning a force of men was set to work, putting in new timbers in the main entry; and the other changes were promised as soon as men could be gotten to do it.

The company's other mine is situated about one mile west of Centerville. There is a capital invested at the mine of ten thousand dollars. The mine is opened by a shaft, using a twenty-five horse-power engine for hoisting the coal. The mine is worked with single entries. The coal is weighed on small scales before being screened. Twenty-nine miners were employed. The capacity of the mine was seventy-five tons per day. The length of the main entry was six hundred feet, with cross-entries. This mine is ventilated with a steam jet. The air-shaft is two feet wide, five feet long and one hundred and forty feet high. There were fifteen working-rooms with a guage of track of three feet, and capacity of the mine cars fourteen hundred and forty pounds. This is a new mine, having been opened only one year. There were no covers on the cages, no brake on the drum, and no escape-shaft. The air in the workings of the mine was poor on account of the curtains being torn so as to allow the air to waste before it gets to the men. I requested the curtains taken off and doors put in place of them. An entry was being driven night and day to get to another shaft, which it is contemplated to use as an escape-shaft for the men. I recommended that double entries be opened and the abandonment of the single entry plan, as it was a new mine; and in the way it was being worked the company would soon be compelled to go to a big expense to ventilate the mine as it should be done.

WATSON SHAFT NUMBER FOUR.

The Watson Shaft Number Four is situated south of Centerville about one mile and is owned by Rufus Ford, of Des Moines. There is a capital invested of forty-five thousand dollars. A twenty-five horse-power engine is used for hoisting the coal. The mine is worked with double entries. The rooms are driven forty feet wide with two roads in each room. The coal is weighed on small scales before being screened. Forty-seven miners, three mules, and three drivers were employed. The capacity of the mine was one hundred and fifty tons per day. The length of the main entry is four hundred yards, with three cross-entries driven one hundred and twenty yards apart. The height of air-ways was two feet, nine inches, width seven feet; ventilated with steam. The air-shaft is four feet wide, six long, and one hundred and ninety high. There were fifty working rooms, a gauge of track of three feet two inches, and capacity of mine cars fourteen hundred and forty pounds. The escape-shaft is four hundred feet from hoisting-shaft. The air in this mine was good, although the curtains and doors were somewhat out of repair. There were no covers on the cages, no brake on the drum, and no ladders in the escape-shaft. I gave the company notice of the condition of the mine, and the repairs necessary to be made.

POLK COUNTY.

WATSON MINE, DES MOINES.

I next visited the Watson Mine situated at Des Moines, and belonging to the same company, Rufus Ford, president. The reason I did not visit this mine at the time I visited the other mines in the neighborhood, was that the mine at that time was lying idle, the men being on a strike; so I passed it by until now. This mine is operated by a shaft, using a forty horse-power engine for hoisting the coal. A capital is invested of sixty thousand dollars. The mine is worked with double entries on the east side of the mine, but the entry running west from the main entry is worked single. The coal is weighed on small scales before being screened. Forty-four miners, six drivers, and eight mules were employed. The capacity was fifty tons per day. The full volume of air at the first of the workings was thirty-six hundred cubic feet, but the leakage reduced it until on the west entry there was no current. The mine is ventilated with a fan eight feet in diameter, with an air-shaft six feet square and seventy feet in height. The air-shaft is one hundred and fifty yards from hoisting-shaft, and is used for an escape-shaft. The air-ways are driven three and one-half feet high and six feet wide. There was no brake on the drum, and one of the gates on the lower landing was off. The company had no maps of the mine. This mine has every advantage for good ventilation, but the air is allowed to escape before it gets to the men. The air-course running parallel with the main entry was almost full of refuse in one place where the men had been blasting up bottom; they had put all the lumps which they could handle with their hand into the air-course until it was almost full. I gave the company notice of the condition of the mine, requesting a brake put on the drum, the stoppings repaired, the air-courses cleaned out, and maps made of the underground workings of the mine. I recommended that another door be hung on the traveling way leading to the escape-shaft, for the reason, that whenever the door was opened, the full volume of air passed direct to the upcast. By hanging another door, as both would not be open at once, the current of air would continue to pass around the mine.

JASPER COUNTY.

JASPER COAL AND RAILROAD MINE.

The Jasper Coal and Railroad Mine is situated five miles south of Newton, Jasper county. F. H. Griggs, of Davenport, is president, and D. S. Couch, of Newton, superintendent. A capital is here invested of fifty thousand dollars. The mine is operated by a slope using steam power for hauling the coal, and is worked with double entries. The coal is weighed on railroad scales after being screened. Thirty-four miners, three drivers, and three mules were employed. The capacity of the mine was seventy tons per day. The length of main entry was two thousand feet, with two cross entries driven eighty yards apart. The entries are four and a half feet high and ten feet wide. The full volume of air was six thousand and nine hundred and eighty cubic feet. Ventilation is by mean's of a furnace of twenty cubic feet capacity, with an air-shaft four by six feet, and eighty-two feet in height. There were twenty-five working rooms, with a gauge of track of two feet eight inches. The air-shaft is situated four hundred yards from mouth of slope. The escape shaft is at the air-shaft. It was once a hoisting-shaft, and one side is now used for an air-shaft, and the other for an escape. The machinery belonging to this mine is in good repair. There are two drags for the train on the slope, in case of one breaking; but the interior of the mine is not in very good repair. The stoppings are leaking considerable air, and there was nothing on the entries to force the air into the rooms. I gave the superintendent notice of the condition of the mine, requesting the stoppings be made tight, doors hung on the entries, and maps of the mine made.

MONROE COUNTY.

ALBIA COAL COMPANY.

The Albia Coal Company's mine is situated three miles west of Albia, on the main line of the Chicago, Burlington & Quincy Railroad. The company is composed of Henry Miller, S. W. Bone and Y. B. Lloyd, and has a capital invested of forty-five thousand dollars. The mine is operated by a shaft using a forty horse power engine for hoisting the coal. The mine is worked with double entries. The coal is weighed on railroad scales after being screened. One hundred and sixty miners, twelve drivers, and twelve mules are employed in the mine. The capacity of the mine was four hundred tons of screened coal per day. I did not get the measurement of the mine, the company having no maps, but they have since been made. The air-ways are five feet high and six feet wide. The full volume of air is thirty-eight thousand two hundred and twenty cubic feet per minute. The mine is ventilated by means of a furnace of thirty cubic feet capacity. The air-shaft is seven feet long, five feet wide and one hundred and thirty-eight feet in height. There were eighty working rooms, with a gauge of track of three feet, and the capacity of mine cars sixteen hundred pounds. The company has made a blacksmith shop in the mine, where all of the work is done for the interior of the mine, and it saves the trouble of hoisting miners in the shaft, and the air is divided so the air from the mule stable and the blacksmith shop goes direct to the furnace, and does not affect the air of the mine. The volume of air before alluded to does not include the amount that passes through the mule stable and blacksmith shop. There were no covers on the cages, and the gates on the upper landing needed some repairing, which I requested the company to have done.

There were other mines in operation close to this mine, but they were neither of them working fifteen men, and were accordingly not visited. The Cedar Coal Company is operating two shafts only a short distance from the Albia Coal Company's Mine. There are a great many mines along Cedar Creek, but none of them are employing fifteen men.

MONROE COUNTY.

EUREKA MINE.

The Eureka Mine, of Monroe county, is situated about one mile from Fredric, a station on the C., B. & Q. Railroad. The company is composed of A. P. Minotonye, C. O. Monroe, D. S. Starr and R. A. Furguson. There is a capital invested of eight thousand dollars. The mine is opened by a shaft, using a twenty-five horse engine for hoisting the coal. The coal is weighed on wagon scales, and twenty-seven miners were employed. The mine is worked with single entries. The length of the main entry is two hundred and forty-five yards. The entries are four feet four inches in height, and seven feet wide, ventilated with a furnace of twelve cubic feet capacity, with an air-shaft two feet wide, five feet long and one hundred and twenty feet in height. The air-shaft is joined to the hoisting-shaft. The air in this mine was good with the exception of two rooms. These rooms were driving break-throughs when I was there. There was no brake on the drum, no covers on the cages, and no gates on either landing, and no maps of the workings of the mine. I requested that the necessary improvements be made. The escape-shaft is through another mine, belonging to the Akers Brothers. By mutual consent their works are driven so as to connect the two mines, which are about one hundred yards apart, so that in case of accident at either shaft, the men can escape at the other. The Akers Bros. were working their mine longwall. This coal is suitable for that kind of work, as there is a seam of slate about one foot in thickness in the center of the coal, which can be used to good advantage, building walls along the roadways, and filling the space behind the workmen as they advance.

LUCAS COUNTY.

WHITEBREAST MINE.

The Whitebreast Mine is situated at Cleveland, Lucas county, on the main line of the C., B. & Q. Railroad. J. C. Osgood is president and Thomas J. Phillips, superintendent. The company has a capital invested of one hundred and fifty thousand dollars. The mine is operated by a shaft, with double entries, using a double engine with eighty horse-power for hoisting the coal. Three boilers furnish steam for the hoisting engines and for the engine which runs the fan. Four hundred and five men and forty-two mules were employed and working two shifts. Two hundred and twenty-seven miners, thirty-three mules and twenty-one drivers were working on the day-shift, and the balance were working nights. The capacity of the mine is six hundred and forty tons per day; the length of main entry two thousand feet; the size of air-ways five and one-half feet in height and eight feet wide; the full volume of air thirty-five thousand three hundred cubic feet per minute. Ventilation is with two seven foot downcast fans, making the hoisting-shaft an upcast. The air-shaft is six by eight feet, and two hundred and fifty feet deep. There were one hundred and thirty working rooms, with a gauge of track of three feet two inches. The capacity of the mine-cars is one ton. The downcast is used for an escape-shaft, and the company keeps a rope in the engine-room at the fan and a gin to hoist the men should an accident occur. The air in the mine was all traveling on the entries. I requested doors hung on the entries to force the air into the rooms, and I recommended that they put guides in the air-shaft and provide a cage for hoisting men in time of accident. The company has another shaft sunk just one-half mile east of the one they are now operating, and was just putting in the machinery. This shaft has three apartments, two for coal and the other intended for lowering timbers and lowering and hoisting men. The company is double-shifting two of the entries intending to connect with the new shaft by the time the machinery is in place, and thinks to be ready to hoist coal at the new shaft by spring.

POLK COUNTY.

GARVER & WALTER'S MINE.

Garver & Walter's mine is situated northeast of Des Moines City. This mine was opened in September last. There is a capital invested of ten thousand dollars. The mine is opened by a shaft ninety feet deep, using a two horse gin for hoisting the coal. Twenty miners were allowed, all that the law allowed until the escape-shaft is sunk. The capacity of the mine was sixty tons per day. There were no covers on the cages and no gates on the landings, but six men were employed outside on improvements. They have started to sink another shaft; but the cold weather came on and they cannot get men to work at it.

WAPELLO COUNTY.

FITZ & POSTLEWAIT'S MINE.

Fitz and Postlewait's mine at Happy Hollow, Wapello county, is situated a little over a mile from the Chicago, Burlington & Quincy Railroad. The dump stands on the side-track at Shock's Station, a tram-road being used to bring the coal from the mine to the dump. They have a capital invested of five thousand dollars. The mine is opened by a drift, mule power is used to haul the coal. The mine is worked with double entries five feet high and seven feet wide. The coal is weighed on railroad scales after being screened. Eighty miners, nine drivers, and twelve mules were employed. Three of the mules were used on the tram-road, hauling the coal to the dumps. The capacity of the mine was ten hundred and fifty tons per day. The length of main entry was one thousand two hundred and six feet, with four cross-entries, driven four hundred and eighty-six feet apart. The first and second west were driven eleven hundred feet, and came to a fault where they were stopped. The third and fourth west were driven fourteen hundred feet. They had been in the fault for about fifty yards, but they were still driving them to see if good coal could not be reached. The full volume of air was seven thousand cubic feet per minute. The mine is ventilated by a furnace of twenty cubic feet capacity, with an air-shaft six feet square and seventy feet high. There were forty-five working rooms with a gauge of track of three feet. The capacity of the mine-cars was one ton each. The distance of the air-shaft from mouth was fourteen hundred feet. The size of the escape-shaft is five feet square, and it is five hundred and fifty feet from mouth of slope. I requested the boss to hang doors on the entries to force the air into the rooms, and to make the maps up to the first of last September, as the law directs.

BOONE COUNTY.

CLIMAX MINE.

The Climax Mine is located at Coaltown, Boone county, on the Des Moines & Fort Dodge Railroad. The company which now owns the mine bought it a short time before I visited the mine, and I did not learn who its members were. The capital invested is fifty thousand dollars. The mine is operated by a shaft, using a twenty-five horse-power engine to hoist the coal. The mine is worked with double entries. The coal is weighed on railroad scales after being screened. Fifty-two miners, two drivers, and two mules were employed. The capacity of the mine was three hundred tons per day. The air-ways were four feet high and six feet wide, and the full volume of air was seven thousand eight hundred and seventy-two cubic feet per minute. Ventilation is with steam, using the exhaust steam from the engine. The air-shaft is joined to the hoisting-shaft and is twenty-two inches wide, six feet long, and one hundred and twenty feet high. There were thirty working rooms, with a gauge of track of two feet, eight inches. The capacity of the mine-cars was one thousand pounds. The escape-shaft is four feet square, and is seventy-five yards from the hoisting-shaft. There were no covers on the cages, and there was no brake on the drum, and the doors and curtains inside the mine were in bad condition. There were places in the mine where the air was very bad. I requested the boss to have covers put on the cages and a brake on the drum, to rebuild some of the brattices, and to take off one curtain and put a door in its place. The maps had not been made up to the first of September; so I also requested that this be attended to. I next went to Greene county, but the mines were all closed on account of a strike.

DALLAS COUNTY.

CHICAGO AND VAN METER COAL COMPANY'S MINE.

I then went to Van Meter. The Van Meter shaft is situated on the Chicago, Rock Island & Pacific Railroad. It is two hundred and fifty-six feet deep; a gin is used to hoist the coal. The mine belongs to the Chicago and Van Meter Coal Company, J. L. Platt, president, and J. M. Thompson, superintendent. This mine's engine-house and dump were burned down last fall, and new machinery is now being put in and it is thought everything will soon be ready for hoisting with steam again. The mine is working only fourteen men and only about fourteen tons per day can be hoisted with the gin. There are no maps of the mine. There is only one shaft and no way of escape for the men should anything happen at the hoisting-shaft. I recommended that another shaft be sunk, as the mining law would not admit of more than ten men working until another shaft had been sunk so that a way of escape could be provided for the men in case of accident.

HARDIN COUNTY.

I next visited the mines of Hardin county: but there were none that were working fifteen men. I went into only one mine in the county. This was Chaffin's Mine at Eldora. It is one of the oldest mines in the State and is about wrought out. The back part of the mine came to a fault where the sandstone of the roof came down and cut the coal out. What coal is left along the fault is being worked out and then it is the intention to attack the entering pillars and take them out. The coal in places in this mine is six feet thick. There was a good circulation of air in the mine.

WEBSTER COUNTY.

December 21st I went to Fort Dodge to visit the mines in that locality. I found that two of the largest mines in the county, belonging to the Fort Dodge Coal Company, were still lying idle. This company's mines are situated seven miles down the river from Fort Dodge. One of them is working thirty-eight miners, and is operated by a drift, mule power being used to haul the coal out of the mines and across the creek to the foot of the hill. Thence there is an incline running up the hill to the dump, an engine being used for pulling the coal up this incline. This mine is where iron miners are being used. There is a stationary engine at the mouth of the mine, where the air is condensed and conveyed into the mine through pipes to a reservoir placed on the main entry. From this reservoir there are two pipes, one on each entry. There were two of these miners in operation when I was in the mine. They not only did good work, but the exhaust adds to the ventilation of the mine. This mine depends altogether on natural ventilation, like all others in this locality, except two shafts belonging to the Fort Dodge Coal Company, where fans are used. There were no maps of this mine. I requested the company to have a map made, and to put in a furnace so as to cause a circulation of air in the mine.

The Craig Coal Company is operating on the west side of the Des Moines River just opposite Coalville. All of this company's mines, seven in number, are operated by drifts, and in all of them reliance is had on natural ventilation. The mines on this side of the river have never been worked very extensively, most of them lying idle in the summer time, but now that the Minneapolis & St. Louis Railroad Company is building a road down on that side of the river, some of the mines are opening with the intention of doing considerable business. The Craig Coal Company had only one mine that was working fifteen men, and I requested that a furnace be put into it to ventilate the mine and that the maps be made as soon as possible.

Walter Irvin's mine is situated about a mile from the river. It is opened by a slope with single entries. The men push the coal from the place of their rooms to the outside of the mine. Thirty-three men were employed. The capacity of the mine was fifty tons per day. The entries were driven five and one-half feet wide and of the height of the coal, which is from five to six feet. Natural ventilation is relied on. The full volume of air was fifteen hundred and eighty-six cubic feet. There was nothing on the entries to force the air into the rooms. It passed in at the mouth of the mine, going direct to the upcast, which was a shaft, about eight feet deep. I requested the operator to sink an air-shaft, to put in a furnace and to have maps of the mine made.

Johnson McDonnough has three mines in operation. All of them are slopes, with only one opening at each mine.

Smith & McGovern have a mine opened by a slope that dips ten inches to the yard. They are employing seven men.

J. Stemlra has slope with one opening.

John Paral has a shaft fifty feet deep. He employs ten men. There are no covers on the cages and no gates on the landing. Natural ventilation.

Thomas Collins is working two mines on the east side of the river. Both are opened by drifts. Nine men were employed in each.

The Minneapolis & St. Louis Railroad has bought a mine on the west side of the river. It has one opening, which is being made larger, so as to have a double entry with two tracks, and another opening is being made in order to connect the two. In this way it is thought natural ventilation will give air enough for what men can be worked. At the time of my visit, a drain was being put in, and had reached a point on the main entry where the door that was hung to turn the air could not be closed, and I could not get a satisfactory test of the air. None of the mines on the west side of the river have any maps. I have given orders to have such maps made.

FIRST ANNUAL REPORT

OF

PARK C. WILSON,

STATE MINE INSPECTOR,

FROM JANUARY, 1881, TO JULY, 1881.

REPORT FOR 1881.

After making out my partial report the first of January, I continued my tour of inspection in the northern part of the coal-field, visiting the mines of Lehigh, Webster county.

WEBSTER COUNTY.

CROOKED CREEK COAL AND RAILWAY COMPANY.

The Crooked Creek Coal and Railway Company has three openings at Lehigh, all drift openings, with a capital invested of one hundred and twenty-five thousand dollars, using mule power. The coal is dumped directly into the railroad flats. The mines are worked on the longwall system. The coal is weighed on railroad scales. They were employing, when I was there, forty-seven men. The capacity of the mine was claimed to be one hundred and eighty tons per day. They had no maps of the mine, and I could not get the measurements of the works. The height of the air-ways was three feet; width, seven; ventilation by a furnace of twenty cubic feet capacity, with an air-shaft fifty feet in height and three feet in diameter. The full volume of air was one thousand nine hundred and forty cubic feet per minute. The air-shaft is situated thirty yards from the mouth of the slope. The escape was by another slope. The different openings were connected, so that in case of accident at one slope, the men could get out at the other. The coal was hauled from the two slopes, which were about one hundred yards apart, on to the one dump. This mine is not in very good condition. One of the openings was at one time worked on the room and pillar plan, and at several places in the mine the men were working in very poorly aired places. The air-course connecting the two openings was too small to admit of the proper amount of air traveling through the mine. In some of the places extra prices were paid in order to get men to work them, as it would cost more to conduct the air to the working place than the coal would be worth after it was taken out of the mine. This company owns the railroad from Judd, on the Illinois Central Railroad, to Lehigh, a distance of eight miles; and they contemplate opening another mine, as soon as the weather will permit, in the spring.

BLACK DIAMOND MINE.

The Black Diamond Mine is situated about one mile from Lehigh on Crooked Creek. W. C. Beam is proprietor, with a capital invested of $10,000. The mine is opened with a drift. There are two openings about one hundred yards apart, and the works connect back in the mine. The mine is worked with double entries room-and-pillar, using mule power. The coal is weighed on wagon scales, hauled in wagons to the railroad track, and there loaded into the cars. Thirty-one men were employed. When I was there the capacity of the mine was forty tons per day; length of main entry 142 yards, with two cross entries driven 120 yards apart, with airways driven parallel with entries, four feet high and six feet wide; all relying on natural ventilation through an air shaft thirty-four feet high and five feet square, situated fifty feet from the mouth of one of the slopes. This mine, at the time of my visit, had good ventilation. It being very cold and windy the entry was closed leading to the air-shaft, and the air was going in at one opening and coming out at the other. The full volume of air was 1800 cubic feet per minute and none of the working places was any distance from the entries. The mine has never been worked very extensively and the air in passing through the mine has no great distance to travel.

BOONE COUNTY.

L. D. Wilber's Mine is situated about two and one half miles west of Boonsboro. It is opened by a shaft with a two horse gin for hoisting purposes. There is a capital invested of $10,000. The mine is worked on the room-and-pillar plan, with what is termed crib entries. The workmen drive twenty feet wide and build what is termed cribs—that is, square pens which are filled with slate in the center. There is a row of these in the center of this room. One side of these cribs is used as a roadway. On the opposite side a space is left of three feet for an air-course. At the time of my visit thirty-one men were employed. The coal was weighed on wagon scales and hauled to the railroad, a distance of about one mile. There were no maps of the mine. It was ventilated by a furnace of twelve cubic feet capacity, situated on top of the ground with a stack about eighteen feet high. The air-shaft was joined to the hoisting-shaft two and one half feet square and 120 feet high. There were fourteen working rooms with a gauge of track of two and one half feet. This mine is in poor condition. It has no escapement-shaft for the men in case of accident at the hoisting-shaft. No covers were on the cages, and no gate on the landings; and the air-courses in a great many places were closed almost entirely up, and there was no place in the mine large enough for a man to get through without crawling, and in some places I could not get through at all. The space was almost entirely closed. I gave the superintendent notice of the condition of the mine, requesting another shaft shunk, covers put on the cages, gates put on the landings, and the air-ways cleaned out so that the air may travel freely through the mine, as the full volume of air was only three hundred feet per minute. The superintendent told me he would have the improvements put in immediately, as he was intending to drive a slope, and would commence in a day or two. I again visited the mine in April and found nothing had been done towards making the improvements I had ordered, except to make the gates on the landings, and they were pushed up as high as one could reach and a wedge driven in behind to hold them up, so that they were of no benefit whatever. The inside of the mine was in no better condition than when I first visited it. I requested the superintendent to reduce his force to ten men; and as he was working only fifteen men and had not steady work for them, he made the reduction. Those ten men, in my opinion, are working in very foul air, and if anything should happen to the hoisting-shaft they would be shut off from any escape, and perhaps perish before they could be got out of the mine; but, as a mine employing only ten men does not come within the provisions of the law, the Inspector could do nothing further. Some of the mines want nothing better than this, because, not having in the summer-time work for more, they would as soon reduce their force as not.

February 9, Logan & Canfield Mine was visited. It is situated about two miles from Boonsboro, on the branch of the C. & N. W. Railway. This mine is opened by a shaft 243 feet deep, using steam power for hoisting purposes of sixteen horse-power. There is a capital invested of $30,000. The mine is mostly worked on the room-and-pillar plan. The proprietors are working two seams of coal, the upper longwall, and the lower with room and pillar. The two seams are only eight feet apart in this section of country. On the west side of the shaft they are working the second seam of coal, and and on the east side the third vein. They were employing at the time of my visit eighty-two men. The capacity of the mine was one hundred tons per day. The mine was ventilated by a fan seven feet in diameter and two feet wide. The air-shaft is joined to hoisting-shaft, and is three feet wide by six feet long. There were thirty-one working-rooms in the mine, with a gauge of tracks of two and one-half feet. The escape-shaft is situated about 370 yards from the hoisting-shaft, is twelve feet long, six feet wide, and one hundred feet deep, and was formerly used as a gin-shaft.

This mine was in poor condition. The escape-shaft had part of a ladder in it, but it did not reach to the bottom of the shaft, and if it had done so it was too old and rotten to be safe for men to climb out on; the manway leading to the escape was almost full of water back from the bottom of the shaft, and the return air-course had fallen in, and air was conducted to the upcast-shaft by an overcast over the main entry, and the overcast was not made tight enough so that the air, as it came down the hoisting-shaft, passed up through the bridge of the overcast and direct to the upcast-shaft, and consequently was of no benefit. The full volume of air was 860 cubic feet per minute, which was not nearly enough for the men employed; besides the mine produces a great amount of gas. It is troubled to a great extent with gob-fires. There were places in the mine where the air was actually hot from the heat of the fire in some of the old works. I notified the superintendent of the condition of the mine, requesting the manway cleaned out, the water taken out, and as the escape-shaft was used for hoisting water by means of a gin with a barrel in each side of the shaft, I recommended that they put a cage in one side of the shaft, so that in case of accident at the hoisting-shaft the men could be hoisted out with the gin. I also requested the return air-course be cleaned out and timbered, so that the overcast before referred to could be dispensed with, and the air, instead of escaping, be conducted to the men.

I again visited the mine in April, and found the manway all cleaned out and a cage in one side of the escape-shaft. The return air-course was also cleaned out and considerable improvements had been made otherwise. On testing the current of air I found instead of 860 cubic feet per minute, a volume of 4,800 cubic feet per minute. Yet it was not conducted to where the men were working. The workmen in the longwall workings were better cared for than those in the other part of the mine. In some of the rooms the air was thick and heavy, and the miner's lamp burned with a dull flame. I called the company's attention to the law and asked that the force be reduced.to ten men until the mine could be brought into the conformity with the law. The proprietors said they were law-abiding citizens, and would reduce their force with the underunderstanding that as soon as they thought they had everything in good shape they would notify me, when I was to inspect the mine, and, if everything should be found satisfactory, I would let the men go to work. They accordingly called on me again in May, stating they would have everything in good shape by the next Monday, and asking me to come and inspect the mine. When I got to the mine I found they had hung another door and made considerble improvements, while the volume of air was increased to 10,255 cubic feet, and the sanitary condition very much improved. There was some narrow work, which they had failed to get driven on account of a fall, but they had the fall almost cleaned up, and had only about another yard of coal to take out, and the miners told me they could hear the car on the opposite side. So I let the men go to work with instructions to the company to timber some of the entries, and make some of the air-ways larger. The mine is not in first-class condition, but there has been a big improvement, and the proprietors say they intend to keep on until they have everything in good shape.

LOWER VEIN COAL COMPANY.

This mine is situated a short distance west of Logan & Canfield's Mine. It also has a railroad track to the mine. It is operated by a shaft 245 feet deep, using steam power, double engine of 25 horse power. Capital invested, $50,000. The mine is worked on the longwall system. The coal is weighed on railroad scales after being screened. At the time of my visit 85 men were employed. The works have capacity of one hundred and twenty tons per day. The mine is ventilated by a fan, the full volume of air being 3,000 cubic feet per minute, with an air-shaft four by six feet, 245 feet high, and joined to hoisting-shaft. The escape was through an old slope four feet in height and five feet in width. At the time of my visit this was almost closed with ice. Men were engaged cleaning out the ice, which, when accomplished, would double the volume of air; but the weather being very cold the water freezes as fast as it accumulates. The air is carried in one continuous current around the face of the longwall, or working-places of the mine, and in that way the first man was compelled to work with his coat on whilst the last man had scarcely air enough. I recommended that the air be divided, so as to let only part of the volume on the first of the men, increasing it at the different roadways leading to the face. I found on visiting the mine again in April, the plan suggested had been adopted with satisfaction to the men.

MILFORD COAL COMPANY.

This mine is located on the west side of the Des Moines river, just west of the Boonesboro mines. The mine is operated by a shaft seventy feet deep, using a two-horse gin for hoisting purposes. The mine is worked with room-and-pillar, single entry. The coal is weighed on wagon-scales, after being screened, and is hauled across the river to be loaded into the cars. Twenty-four men were employed. The capacity of the mine, at the time I was there, was thirty tons per day. Natural ventilation was relied upon. There were two openings; the shafts were about seventy-five yards apart, and the shaft that had been the down cast was full of ice. A man-way was joined to the hoisting-shaft. At the time of my visit the air was traveling down the hoisting-shaft, and up the man-way. There were no covers on the cages, no gates on the landings, and no ladders in the escape-shaft; and if there had been, the men could not have got out, for the place was full of ice. I gave the superintendent notice of the condition of the mine, requesting that covers be put on the cages, gates on the landings and ladders in the extra shaft to be used as an escape-shaft. When I visited the mines in that section again in April, the mine was working only six men, and the ferryboat was not running on the river. So I did not visit that mine on the second tour.

ROGERS & CROW MINE.

This mine is located on the east side of the Des Moines River, close to the river bank. The mine is operated by a shaft, using a two-horse gin for hoisting purposes. Part of the mine is worked with room-and-pillar, with single entry; and part is worked longwall. The coal is weighed on wagon-scales, and hauled to the railroad track, a distance of about a mile. Thirty men were employed at the time of my first visit. The capacity of the mine was thirty-five tons per day. There are no maps of the mine. It is ventilated by a furnace of ten cubic feet capacity. The air-shaft is joined to the hoisting-shaft. There is no escape-shaft for the men in case of accident at the hoisting-shaft. There were no covers on the cages, nor gates on the landing; and all of the underground workings were in bad condition. The air-ways are too small to give good satisfaction. I notified the superintendent of the condition of the mine, requesting covers put on the cages, gates on the landing, and an escapement-shaft sunk. When I visited the mine again in April operations had been extended too near the river, and the water had broken into the mine, and nothing was being done. The vein of coal at this place is about on a level with the bed of the river. I spoke to the foreman about the danger of driving the underground workings too close to the river, but he thought there wás no danger of the river bothering them, but he now thinks differently.

MOINGONA COAL COMPANY.

Of this company, P. E. Hall, of Cedar Rapids, is president, and William Blyth, of Moingona, superintendent of the mine. The mine is located at Moingona, Boone county, on the Chicago & Northwestern Railway. The company has a capital invested of one hundred thousand dollars. The mine is operated by a shaft, using steam power of twenty-five horse-power for hoisting purposes. The mine is worked on the longwall plan with good results. The coal is weighed on small scales before being screened. At the time of my visit one hundred and forty-five men were employed, and the capacity of the mine was three hundred and fifty tons per day. The mine is ventilated by a furnace of sixteen cubic feet capacity, situated on top of the ground with a brick stack about twenty-five feet high. The full volume of air was eight thousand eight hundred and forty cubic feet per minute with an air-shaft four by six feet and one hundred and fifty-five feet high. The air-shaft is joined to hoisting-shaft. The escape-shaft is six by ten feet, situated about four hundred yards from hoisting-shaft. It was once used as a hoisting-shaft, but the works at that shaft are abandoned. This mine is in good condition in regard to ventilation. The air is so divided, or split, as to give the first men on the air about one hundred and ten cubic feet per minute, and increased at every roadway leading to the face of the coal, so that the last man had over eight thousand cubic feet traveling by his working place. But the men were riding up and down the shaft against loaded cages, which was ordered stopped immediately, and the superintendent notified not to allow any man to ride against a loaded cage.

NORTHERN COAL COMPANY.

R. E. Montgomery, of Ft. Worth, Texas, is president, and W. D. Morgan, of Moingona, superintendent. This mine is situated about two miles west of Moingona, on the Chicago & Northwestern Railway. It has a capital of thirty thousand dollars invested. The mine is operated by a shaft, using a forty horse-power engine for hoisting purposes, and is worked on the longwall plan. The coal is weighed on small scales before being screened. At the time of my first visit sixty-three men were employed. The capacity of the mine was one hundred and ten tons per day; and it was ventilated with a fan. The full volume of air was one thousand seven hundred and fifty-two cubic feet per minute. The air-shaft is joined to the hoisting-shaft and is four by five feet, and one hundred and thirty feet high. The escape-shaft is three and one-half by four feet, situated sixty yards from the hoisting-shaft. This mine, at the time of my visit, was not in first-rate condition. The air-courses had been allowed to fill up in some places until they were too small for good results, as they were using a seven foot fan, with which if the airways had all been of good size, the mine would undoubtedly have had a volume of three times what they now have.

HUTCHINSON BROTHERS MINE.

James and John Hutchinson, Zenorsville, Boone county, proprietors. These mines and all the mines in the vicinity are known as the Squaw Creek Mines. This mine has a capital invested of $6,000. The mine is opened by a slope. A one-horse gin is used for hauling the coal to the surface. The mine is worked by room-and-pillar, with single entry. The coal is weighed on small scales. Forty-three men were employed when I was there. This mine has employment for very few men in the summer time. The coal is sold to the country trade, and is what is generally termed a country mine; but in the winter there is a very large trade. The capacity of the mine was about 100 tons per day. Reliance is had on natural ventilation. There is an air-shaft about 350 yards from the mouth of the slope that is four by four feet and 100 feet deep. The full volume of air was 5,400 cubic feet per minute. There were eighteen working-rooms with a gauge of track of two feet four inches. The capacity of the mine-cars was 800 pounds. The air-shaft was intended as an escape-shaft for the men; but there were no ladders or anything by which the men could escape in case of accident in the slope. There was no drag in use behind the cars on the slope. There was a small drag there which I caused to be used while I was there, and I requested that a larger one be made and used on every trip hauled out of the mine, because if anything should break while men were in the slope behind the loaded cars it would be a miracle if some were not injured.

SQUAW CREEK MINE.

John Clemmons, Zenorsville, Boone county, proprietor. This mine is situated on Squaw Creek, only a short distance from Hutchinson Brothers' Mine. The mine has two openings, one a slope and the other a shaft, using gin power. It is worked on the room-and-pillar plan, with single entries. The coal is weighed on small scales. Thirty-six men were employed at the time of my visit, and the capacity of the mine was seventy tons per day. The air-ways were driven three feet eight inches high and six feet wide. The mine was ventilated by a furnace, but at the time of my visit to the mine a great portion of it was full of water. The pump had given out and the proprietor had neglected to send for a new one until about the time of the snow blockade. Consequently they had no way of getting the water out of the mine. The air-courses were almost entirely full of water in places and for that reason there was no current of air traveling through the mine. This mine, like all the others on this creek, depends mostly on the local demand. No coal is sold to the railroads. Consequently in the summer time only a few men are kept, and perhaps for eight months in the year less than ten men are worked. Hence, the mine is not subject to the requirements of the law.

WARREN COUNTY.

SUMMERSET MINE.

John and James Sumsdon, Summerset, proprietors. This mine is situated on the river bank just opposite Summerset. The proprietors have a capital invested of $4,000. The mine is operated by a shaft; using a one-horse gin for hoisting purposes. It is worked with room-and-pillar, double-entry. The coal is weighed on small scales before being screened. At the time of my visit nineteen men were employed; the capacity of the mine was sixty tons per day; the length of the main entry was 200 yards, and the air-ways were 3½ feet high and 6 feet wide. Ventilation is by a furnace of 7 cubic feet capacity. The air-shaft is 27 inches wide, 5 feet long, and 90 feet high. The full volume of air was 640 cubic feet per minute. There were 80 working rooms with a guage of track of 2½ feet. The capacity of the mine cars was 600 pounds. The air-shaft was joined to hoisting-shaft. This mine is in poor condition, having no covers on the cages, no gates on the landings, and no escape-shaft for the men in case of accident at the hoisting-shaft. I notified the superintendent of the condition of his mine, requesting covers put on the cages, gates put on the landings, and an escape-shaft sunk. I again visited the mine April 6th, and found that they had not yet complied with the law. The proprietors had come to the conclusion that it would be cheaper for them to abandon the shaft, and sink a new one, than to make the necessary improvements the law required. The force was already reduced to seven men with the intention of soon quiting operations altogether at this shaft and sinking a new one farther down the river.

There is a number of other mines in the vicinity of Summerset that were working only a few men at the time of my visit to the county, and consequently were not subject to the mining law at that time.

WATSON MINE.

This mine is situated at Ford's Station, on the A., K. & D. branch of the C. B. & Q. railroad, Rufus Ford is president; capital invested $9,000. The mine is opened by a slope; and at the time of my visit steam power was being put in for the purpose of hauling the coal up the slope; the mine is worked on the room-and-pillar plan, with double entries, the coal is weighed on small scales. Thirty-three men were employed, and the capacity of the mine is 50 tons per day. The air-ways are 3½ feet height and seven feet wide, ventilated by a basket. The air-shaft is 4½ by 5 feet, and 28 feet high, being built at the mouth of an old drift opening and situated at the foct of a very steep hill. It is about 40 yards from the mouth of the drift where the coal is brought from the workings of the mine. There are 20 working-rooms with a gauge of track of 2½ feet. The capacity of the mine-cars was 1,000 pounds. The escape is by another slope belonging to the same company, which is used to supply the country trade. This mine is in fair condition for the number of men employed. I notified the president as to condition of the mine, stating that in case he should want to emply more men, it would be necessary to make an improvement in the shape of a furnace, instead of the basket now in use; and as there was nothing but a single door, and it not very good to keep the air from the outside of the mine going directly to the furnace, I requested a tight stopping made inside where the door now hangs, so that what air passsed over the furnace would have to travel through the mine instead of coming from the surface and going up the air-shaft, and thus being of no benefit to any one.

MARION COUNTY.

KNOXVILLE CITY COAL COMPANY.

W. A. Gamble, Knoxville. This mine is situated in the northeast edge of Knoxville, and has a capital invested of one thousand dollars. The mine is opened by a shaft using a one-horse gin for hoisting purposes. It is worked room-and-pillar, with single entry. The coal is weighed on wagon scales after being screened. At the time of my visit fourteen men were employed. The capacity of the mine was thirty tons per day; main entry was driven 115 yards from the shaft; the air-ways were driven through rooms, and were four feet high and seven wide. The mine at one time had been ventilated by a stove, situated at the bottom of the air-shaft; but there was no fire in it at the time of my visit, and I don't think there had been any for some time, as it was almost covered with mud which had fallen down the shaft; hence, at this time, natural ventilation was depended upon, which gave 900 cubic feet of air per minute. The air-shaft was four by four feet, and height of air-shaft forty feet. There were eight working rooms, with a gauge of track of two feet four inches; capacity of the mine-cars, 800 pounds. The air-shaft is situated about seventy-five yards from the hoisting-shaft. This mine is in poor condition. There were no covers on the cages, no gates on the landings, and no escape-shaft for the men in case of accident at the hoisting-shaft, while the ventilation was very poor. Although this mine, as it employed less than fifteen men, did not come under the law, yet, as I was called upon to inspect this mine, I notified the proprietor of its condition, requesting covers put on the cages, gates put on the landings, a furnace put in the mine for ventilating purposes, and the hoisting-shaft re-timbered, as it had been badly damaged in cutting ice out of the shaft, some of the timbers being almost cut in two, and that the mining law would not allow him to work more than ten miners until the mining law was complied with. He concluded he would rather sink a new shaft than to repair the old one; he will abandon the present shaft, and sink a new one nearer the railroad, so that he can get a side track for loading cars.

J. T. JAMES & CO.'S MINE.

Of this mine I gave a description in the first part of my report. I visited it again March 11, 1881, and found the proprietors had made the improvements I had requested. They had taken the stove out of the mine, and in its place had built a furnace of twelve cubic feet capacity, and the full volume of air was increased from 1,776 cubic feet per minute to 4,900. They had covers on the cages and gates on the landings, and the general safety of the mine was improved. At the time of my first visit, I advised the foreman to abandon the plan of driving the entries twenty feet wide, building a double wall, and in that way getting a double entry, and he concluded to take the advice for the mine had only a short distance driven in that way, and it gave them more trouble than all the balance of the mine, on account of the leakage of air. When I was there in March, they were driving cross-entries to carry the air so as to avoid this crib entry, as they could not get it so but it would leak the full volume of air before it reached the miners' working place. They had about thirty yards to drive the cross-entries until they connected, and then the mine would have good ventilation throughout.

SOUTH CEDAR MINE.

The South Cedar Mine is situated at Marysville, R. H. Lenor and John Yenzer, proprietors. They have a capital invested of $3,500. The mine is opened by a slope, and is worked on the room-and-pillar plan, with single entry. They weigh the coal on wagon-scales. The air-shaft is seventy-five yards from the mouth of the slope and there are three openings that will admit of men escaping in case of accident. I could not get into the mine for the reason that it was full of water. A ditch had been dug to run the water from the creek into the mine on account of a fire which had started in an old mine that belonged to another company, but the two mines are connected under the ground, and as the mines have little to do in the summer time, they became filled with water to keep down the fire; but the fire has got under such headway and there are so many openings to give it fresh air, that it will take some time to conquer it. This is a piece of carelessness by which one good mine is lost, and not only so, another is damaged, as the slate, coal and all, are on fire; and, unless the fresh air is shut out, it will burn for years, perhaps, without stopping.

FLAGLER MINES.

I visited the mines of Flagler August 4th. Found the Flagler Mine in fair condition, with the exception of two places, and arrangements were being made to better the condition of those places. I found the improvements I had recommended on a former visit all made. There was considerable roof falling in places throughout the mine, caused by the action of the warm air from the outside of the mine; but a force of men were employed in timbering and looking after that kind of work.

The Oak Hill Mine was not running as the old dump had been torn down, and it was now being re-placed with a new one of larger size and better construction.

PAGE COUNTY.

CLARINDA MINE.

This mine is situated two and one-half miles southeast of Clarinda on the Nodaway River. It is worked by Thomas Proser, who has a capital invested of $1,000. The mine is operated by a shaft and two slopes, using mule-power at both slopes, and a one-horse gin at the shaft for hoisting purposes. The mine is worked on the room-and-pillar plan, with single entry. The coal is weighed on wagon-scales, and at the time of my visit they were working sixteen men; the capacity of the mine was twenty tons per day; the length of main entry was 270 feet; the cross-entries were driven 150 feet apart; the air-ways were driven sixteen inches (the height of the coal) and five feet wide. Natural ventilation was relied upon. There were fourteen working-rooms with a gauge of track of two and one-half feet; capacity of mine cars five bushels each. This mine is not in good condition. There were no covers on the cages and no gates on the landings, and there was no circulation of air through the mine. The air-ways were in good condition, with doors and stoppings all in good order; but the trouble was that the air was passing in at one of the slopes and out at the other slope, and not going to the men in the back part of the mine. The opening of one slope was over eight or ten feet higher than the opening of the other, hence the air failed to travel around the works and pass out at the hoisting-shaft, as was intended, because an old hoisting-shaft with which the works were connected sometimes, acted as an up-cast. I requested the foreman to hang a door on one of the slopes, and to build brattices disconnecting the present works from the old shaft, thereby giving only one intake and one outlet for the air, thus causing the air to pass in at the slope left open and out at the hoisting-shaft; and in that way it would necessarily travel by the working place of the miners. But before the improvements were all made, the river overflowed and filled the mine with water and not much will be done toward fixing up the mine until the fall, because, as all of the coal is sold to the country trade, the demand in the summer months would not warrant much expense in repairing the mine.

There are four other mines in operation in this county: Pinkerton shaft, five miles from College Springs; William Aikin's and William McClane's; and all the coal in this county which is being worked is only about sixteen inches thick.

TAYLOR COUNTY.

There are four mines in Taylor county. Smith Patch has a mine operated by a slope. The Burnside Mine is also operated by a slope, and Nathan Wilcox and Samuel Moore have each a shaft thirty feet deep.

ADAMS COUNTY.

CARBON MINES.

John and Thomas Gabbie, of Quincy, have a mine operated by a shaft. A capital invested of four hundred dollars, using a one-horse gin for hoisting purposes. The mine is worked on the longwall plan. The coal is weighed on wagon scales, and about twenty men are employed. In the cold weather when there is a demand for coal, the capacity of the mine was two hundred and fifty bushels per day. The length of main entry is one hundred and seventy feet; the height of air-ways, eighteen inches, and width, four feet; ventilated by a stove. The air-shaft which is four by four feet, being joined to hoisting-shaft. The capacity of the mine-cars was four hundred pounds each; and gauge of track, two feet and three inches. This mine is in poor condition. It is operated by a single shaft, with no covers on the cages, no gates on the landing, and no escape for the men in case of accident at the hoisting-shaft: neither is the ventilation good; but the shaft had been in operation but ten months, and the law allows one year for making the second outlet. This is about the limit to which one of these shafts is operated; by that time the coal is worked out so far from the shaft that the owners prefer to sink a new shaft, rather than to make the roadways in the mine of sufficient height so that they could handle the coal with any economy.

RIMBY'S MINE.

This mine is situated at Carbon, Adams county, and is operated by a shaft forty feet deep, using gin power for hoisting purposes, with a capital invested of one thousand dollars. The mine is worked on the longwall plan. The coal is weighed on wagon scales. At the time of my visit fifteen men were employed; the capacity of the mine was twenty tons per day, and the air-ways were driven three feet high and five feet wide. Natural ventilation was relied upon. The air-shaft was four by six feet, thirty feet deep, and situated forty yards from the hoisting-shaft. There were no covers on the cages, and no gate on the landing. It was only a single shaft. The miners descended by sliding down the rope. There was a ladder in the hoisting-shaft by which men could come out of the mine.

BELL'S MINE.

A. Bell, Carbon, Adams county, is proprietor. This mine is operated by two single shafts, forty-two feet apart, the gin standing between the two shafts. Mr. Bell has a capital invested of one thousand five hundred dollars. The mine, like all others in this county, is worked longwall. The coal is weighed on wagon scales. At the time of my visit, thirty men were employed, and the capacity of the mine was fifty tons per day. The length of main entry, forty yards; the air-ways were driven three feet high and seven feet wide, and the mine was ventilated by natural ventilation, one shaft being used as an air-shaft; the other as downcast for the air; and there was no telling which was going to be the upcast, as both of the shafts were on a level on the surface and of equal depth. Sometimes the air would force down one shaft and then down the other, and again down neither, as the pressure of the atmosphere would be alike on both shafts, consequently, at times, there would be no circulation of air in the mine. There were no covers on the cages; and the men were riding against loaded cages. While I was there, some of the men would cage their car of coal at the bottom of the shaft, then get on top of the car on the cage, and ride to the surface. There were no gates on the landings, and nothing to protect the top of the shaft; and there was no escape-shaft. As the two hoisting-shafts were forty-two feet apart, they could not, under the law, be accepted, as the law says they must be, separated by fifty feet of natural strata.

There were ten other mines situated in the county, all of them operated about as those already described. The coal in all of them ranges from sixteen inches to two feet in thickness. Not many men are employed in the summer season. As the coal is all sold to the local trade, they ship none on the railroads. The mines are eight miles from Corning, a station on the Chicago, Burlington & Quincy railway. Starley's mine, however, is an exception, it being at the north edge of the county, close to the county line of Cass county.

CASS COUNTY.

Royal Hudspath has a shaft in Cass county, just close to the south line of the county.

WHITEBREAST MINE.

I visited this mine the second time, March 18, 1881, and found it in fair condition. On testing the full volume of air, I noticed a decrease of about eleven thousand cubic feet in a minute in the volume. I communicated the fact to the superintendent, Mr. Phillips, in the evening. He sent two men to look the matter up, and reported to me the next morning that on examination they found that ice had joined at the bottom of the downcast shaft, partly filling up the air-way, and thereby obstructing the passage of the air by increasing the friction; but that the men had removed the ice, and requested me to test the circuit of air again; which I did, and found that there was forty thousand eight hundred cubic feet per minute. At the date of this visit, four hundred and seventy-five men were employed, and the capacity of the mine was increased seven hundred tons of lump coal per day. Work had commenced in the B shafts, and eighteen men working it down. They had sunk the bottom of the shaft deep enough so that they had taken up about five feet of fire-clay at the bottom of the shaft. Sloping gradually to the shaft, and making a down grade for the loaded cars to travel, a ditch about two feet deep on each side of the entry, and about eighteen inches wide, had also been dug, and, commenced in the bottom of this ditch, a stone wall laid in cement, had been built, from the bottom of this ditch to the bottom of the coal. Then the timbers for the entry were placed on top of this stone wall, placed close enough together to touch, as did also the cross-timbers over the entry, the whole thing making what would be considered a splendid job, not only as a protection to the entry, but as economizing the handling of the coal. The entries from the old shaft came within about three hundred feet of connecting with the new shaft. When the two shafts are connected under ground they will then split the air, and in that way improve the ventilation all through the mines.

The company operating the "old coöperation" shaft were experiencing some trouble with the water, as the pump had given out, and as the mine was not working men enough to come under the requirements of the mining law, I did not inspect it; but the foreman told me he intended ventilating the mine with a fan not less than eighteen feet in diameter, which will be the largest fan in the State; and with air-ways and an upcast of proportionate size, it will give good satisfaction to the miners employed.

MAHASKA COUNTY.

The Elida Mine is situated just west of Knoxville Junction, on the Knoxville branch of the C., R. I. & P. Railway. E. J. Evans and J. T. James are proprietors. The mine is opened by a slope with a steam engine of twenty-five horse-power. The capital invested is $20,000. The mine is worked by room-and-pillar, with double entries excepting the first south entry, which is single. The coal is weighed on railroad scales after being screened. At the time of my visit, fifty-one men were employed; the capacity of the mine was 156 tons per day; length of main entry was 700 feet, with two cross-entries driven 180 feet from main entry, air-ways driven through rooms on first south, but in the rest of the mine the air-ways were driven parallel with entry; height of air-ways five feet, width seven. The mine was ventilated by building a fire on some bars of iron at the bottom of the air-shaft, which was four and one-half feet by four and one-half feet, and forty-six feet high. The full volume of air was 2,079 cubic feet per minute. There were twenty-two working rooms with a gauge of track of two feet nine inches; the capacity of the mine-cars was one ton each. The distance of the air-shaft from the mouth of the slope was 120 feet. The mine was not in very good condition. Some of the men were working almost sixty yards in advance of the air, because there were not break-throughs between the rooms, although they had been ordered by the mining boss to make break-throughs, yet for some reason they had neglected to have it done. There was no escape-shaft for the men, but as the mine had not been opened one year that could be put off a little longer. I notified the superintendent of the condition of this mine, requesting a furnace put in the mine, an escapement provided for the men and a larger drag made to fasten on behind the train of loaded cars in the slope, as the one in I considered too small to be of any service should the rope or any of the couplings of the cars break.

This company has another slope in operation about 100 yards from the one referred to, which it intends to open out in time for the winter trade to a considerable extent, but at this time it is working only a few men. It is intended to use steam power, and during the coming winter to be able to handle considerable coal.

BUCK CREEK MINE.

Robert Evans, New Sharon, Mahaska county, proprietor. This mine is located four miles east of New Sharon. It is operated by a slope, using mule-power. Capital invested, $3,000. The mine is worked with room-and-pillar with single entry. The coal is weighed on wagon scales and sold altogether to local trade. The summer demand furnishes work for only two or three men, but in the winter time eighteen or twenty men are employed. The capacity of the mine was 2,000 bushels per day. The main entry was driven a distance of 200 yards with two cross entries, each 200 yards in length. The air-ways were four and one-half feet in height and seven wide, ventilated by natural ventilation, the air-shaft four feet square and forty feet high, being situated fifty yards from mouth of slope. The escape-shaft is situated 150 yards from mouth of slope. The mine was working only a few men. I recommended a furnace put in for ventilation; also ladders put in the escape-shaft to afford means of escape in case of accident in the slope.

EVANS' COAL BANK.

Williams E. Evans, New Sharon, Mahaska county, proprietor. This mine is located about four miles northeast of New Sharon and has a capital invested of $20,000. There are two openings, both slopes using mule-power. The mines are worked with room-and-pillar, with single entry. The coal is weighed on wagon-scales after being screened. About twenty-five men are employed. The airways are driven five feet high and seven feet wide, ventilated by a stove placed at the bottom of the air-shaft, which was four feet square and fifty-five feet high.

There were twelve working-rooms with a gauge track of three feet two inches; capacity of mine-cars fourteen bushels. The air-shaft is situated about 300 yards from mouth of slope. There were no ladders in the escape-shaft. I requested that they be put in, also a furnace put in place of the stove.

There are several other mines situated in the vicinity. Jacob Heightsman has a shaft. Hugh Smith has a slope. James Roberts has a slope. Guthrie has two shafts and one slope, but they are worked on the same plan as the two above described.

EXCELSIOR MINE.

Situated two and one half miles south of Oskaloosa. There had been some complaints made by some of the miners here stating that the air was not good in the rooms. I had notified the superintendent, Mr. Durfee, of the complaints, requesting him to have it attended to. When I visited the mine I found that some of the rooms were not very well ventilated, for the reason that while the mine was idle last winter during the snow blockade, several of the rooms had fallen in, and that in working around the rooms which had fallen in the men were compelled to work in air not altogether the best. But in the worst air where they were working there was over 400 cubic feet of air per man per minute traveling on the entry from which the rooms were turned off. The boss had stopped some of the rooms the morning I got there, and given the men orders to square up their places, but the men told me they would rather work on where they were than to turn new rooms. After going all through the mine I came to the conclusion that the foreman was doing the best he could under the circumstances. There are times when the boss cannot have a current of air at the face of every room, especially when a mine stands idle for some time and some of the rooms have fallen in. There were places in the mine where there was poor air on account of not having break-throughs. I called the boss's attention to this, requesting it attended to as soon as possible.

The new shaft, No. 2, was not quite ready to work, although the dump building was up and the machinery was being put in with the intention of getting ready to commence work by the 15th of July.

CONSOLIDATION COAL COMPANY OF MUCHAKINOCK.

This company's stockholders have bought out the interest in the old Consolidation Company of J. K. Graves and H. W. McNeill. The company now consists of Marvin Hughitt, J. E. Buxton, J. B. Redfield and M. M. Kirkman, but still retains the name of the "Consolidation Coal Company." Mine No. 3 was visited June 16, and was in good condition with the full volume of air, 13,616 cubic feet per minute. No. 2 is a new mine just begun in the spring. It is opened by a slope, but the machinery was not in place nor the dump building up, They were hauling the coal with mules and shoveling it into the railroad cars. This mine is opened with three parallel entries, the air passing in on the main entry is divided or split at the back of the mine using an overcast for the air on the west side of the mine to return to the air-shaft, but at the time of my visit there were no doors to turn the air into any particular portion of the mine. Ventilation at present is had by means of a temporary furnace with the intention of using a fan when the machinery is in place. The air-shaft is nine feet in diameter and thirty-six feet deep. No rooms have been turned. All the work in the mine is narrow work, such as entry-driving and air-ways, which are driven seven feet wide and six feet high. If the entries are driven as they now are until winter, the mine will have the capacity to work at least 500 men. I requested the superintendent to furnish lumber and have doors and stoppings made so as to convey the air to the face of the working places. The full volume of air was 7,560 cubic feet per minute, with thirty-six men employed on the day-shift, and about twenty working on the night-shift.

Mine No. 1.—This mine was in poor condition in regard to ventilation. The full volume of air was 6,885 cubic feet per minute with sixty-one miners, ten mules, ten drivers and two roadmen. In making calculations, I allow one mule as much air as three men, which would make the force in this mine equivalent to ten men. There were two entries on the north side of the mine where the air was very poor, it being carried in one continuous current through the mine, gathering all the impurities of the mine as it passed down to the entries above referred to. There the current was only about fifty-four cubic feet per man per minute and the quality very poor. I notified the superintendent of the condition of this mine, requesting immediate attention.

I again visited the mine July 11. On testing the full volume of air I found it had decreased about 1,000 cubic feet per minute, but there was not so much leakage through the brattices and doors as on the former visit. The volume of air on the north entries, above referred to as being so bad was increased to 134 cubic feet per man per minute, yet the ventilation was not good, as there was too many impurities mixed with the air. I called the attention of the superintendent to the matter, requesting an overcast put in so as to let the air from the back part of the mine go directly to the furnace, and not down to the men on these north entries, and divide or split the air, giving the men on the north entries referred to fresh air instead of the impure article they now have. The more impurities there are mixed with the air, the greater the volume should be, in order that it will not be injurous to the men; but there seems to be an idea that if there is a good current of air passing through any portion of a mine there is no need of complaint, no matter how impure that current may be; the quantity and not the quality, of the volume of air that is traveling, being considered decisive.

BURDESS MINE.

John Burdess, Oskaloosa, proprietor. On my first visit to this mine, I found it deficient in ventilation, and in not having an escape-shaft. I gave the owner notice of the condition of the mine, and when I visited it again, I found that there had been an escape-shaft provided, but the ventilation was not so good as it was on a former visit. At some places in the mine there was no circulation of air, and in a great many places where the men were working their lights burned with a dull, heavy flame. The air had to travel over falls and through old rooms, gathering impurities as it went, until the men were compelled to work in an atmosphere very injurious to their health I ordered the force reduced to ten men, according to section fourteen of the mining law, which order Mr. Burdess complied with. I also requested some of the air-ways cleaned up, some of the break-throughs cleaned out, some new break-throughs made, and the brattices made tight so as to stop the leakage of air, with the understanding that when the improvements were made Mr. Burdess was to notify me and if everything was in good repair I would let the men resume work. Being called upon to be elsewhere at the proper time, I requested Mr. William Bowen, of Beacon, to inspect the Burdess Mine and report to me. I herewith submit his report in full:

BEACON, May 2, 1881.

MR. PARK WILSON—According to your request in regard to the Burdess Mine, I have complied with your wish, and report as follows:

Mr. Burdess and I started from the bottom of the slope, and went to the south entry or lead. There was a good volume of air going through the face of the rooms. I found that there was a good air-course opened at the face where, when you were there, was the fall which obstructed the air. Mr. Burdess showed me the place where you tested the current of air, and found it deficient. This place had been enlarged since you left, and it is now about five feet square and the current of air in passing through would draw the flame of the lamp nearly horizontal from the lamp. I followed on and found the old break-throughs closed up and well clayed in good shape, a good current through the west and north portion of the mine, the doors well fixed and the escape-shaft in good order. I accordingly allowed the men to resume work Saturday.

WILLIAM BOWEN,
Beacon, Mahaska county, Iowa.

EUREKA MINE.

I visited this mine April 27, 1881, and found the ventilation very poor. As I had given the company notice, on a former visit, of the condition of the mine, I now required a reduction of the force to ten men, according to section fourteen, of the mining law, with instructions to drive some narrow work to be used as an air-way, thereby making a shorter distance for the air to travel, and consequently relieving the friction of the current of air. Not only so, but instead of carrying the air through several old rooms which were full of heated gobs, it would be allowed to travel through a clean air-way giving the men good, fresh air, instead of impure air loaded with carbonic acid gas until the miners' lamps would scarcely burn on the entry in the full volume of air that was traveling. As I could not visit this mine when they got the improvements finished, I got William Bowen, the same gentleman who inspected the Burdess mine, to inspect this mine. I herewith submit his report of the Eureka Mine.

PARK WILSON: *Dear Sir*—According to your request I inspected the Eureka Mine and allowed the company to go to work with the full force of men yesterday. The air-course was finished the day before yesterday. There is a very strong current of air passing through the mine now, much more than was expected by anybody here—quite a change to what it has been for a long time. The miners here are glad that there is a law at last to provide pure air which is indispensable to the health of miners. They say, Go on, and have the law carried out. WILLIAM BOWEN,
Beacon, Mahaska county, Iowa.

There are forty-seven mines in this county and about half of them employ, at times in the winter, from twelve to sixteen men each, but as both of my visits in the county have been in warm weather there are several of them that are not on the list as mines subject to the law statute. Some have kept just fourteen men, and in that way avoided inspection, claiming it to be cheaper to avoid being compelled to make improvements than to get the benefit of three or four men's work; taking advantage here of section nineteen of the mining law, which says that the provisions of the "act shall not apply to or affect any coal mines in which not more than fifteen persons are employed at the same time: *Provided*, That upon the application of the proprietors of, or miners in, any such mine the Inspector shall make, or cause to be made, an inspection of such mine and direct and enforce any regulations in accordance with the provisions of this act that he may deem necessary for the safety, or the health and lives, of the miners." There are several new mines being opened in the county with the intention of being able to do considerable business this coming winter, which will add no little to the coal out-put of the county.

SCOTT COUNTY.

There are two mines in this county. They are situated from two to four miles north from Buffalo, a small town on the Mississippi River. This is what is generally termed a pocket of coal as it has no connection with any other bed of coal in the State. The vein ranges from eighteen inches to two feet and a half in thickness, but does not extend over any extent of territory. Some of the mines are worked to a considerable extent in the winter season, and in fact most of them work fifteen men in the winter time. The coal is sold to farmers, who come to the mines after it, or it is hauled to the towns and sold in the market. The mines are worked on a cheap scale, no attention being paid to ventilation or general safety of the men. Some of the mines do not use cages; the coal being hoisted in a swinging box in the shaft, and men are hoisted and lowered by standing with their feet in the rope and holding fast with their hands. At none of the shafts is there any protection whatever at the top of the shaft.

Phelix Mactan has a shaft two and a half miles north of Buffalo, using a one-horse gin for hoisting coal, the mine is worked with room-and-pillar, single entry. The coal is weighed on wagon scales. He employs in the winter as many as twenty-two men, but at the time of my visit there were only three men at work in the mine. When a full force is employed, about thirty tons per day are hoisted. The air-ways were two feet eight inches in height, and five and a half feet wide; and the gauge of track was two feet. The air-shaft was situated about one hundred yards form the hoisting-shaft, ventilated by natural ventilation. The air-shaft was used as an escape-shaft, and was four feet square with a perpendicular ladder nailed to the side of the shaft. The escape is only thirty feet deep The men were not allowed on the cages. There were no gates on the landing and no protection around the top of the shaft. I notified the superintendent of the condition of the mine, requesting gates put on the landings, and covers on the cages (if he hoisted men on them), and a sufficient amount of air made to circulate through the mine to give pure fresh air to all the men employed in the mine.

DODGE MINE.

S. James, of Davenport, and Daniel Dodge, of Buffalo, proprietors. This mine is situated about three miles north of Buffalo, and has a capital invested of $2,500. It has two openings, both shafts; one a gin shaft eighty-one feet deep, at the other steam power is used. The shaft is sixty-four feet deep. Both mines are worked with room-and-pillar, single entry. The coal is dug by measure, counting five bushels to the car. They had last winter fifty-two men employed, but at the time of my visit they were only employing four men in the mine, as the mines were almost full of water and some of the machinery at the steam-shaft where the water is hoisted was broken and the water could not be gotten out of the mine until the machinery was fixed. The capacity of the mine while employing a full force of men is about 2,500 bushels per day. The air-ways are driven two feet ten inches high and ten feet wide, ventilated by building a fire in an iron basket and hanging it down in the air-shaft. The air-shaft is five feet square and twenty-two feet deep. There were twenty-six working rooms, with a gauge of track of two feet six inches. The two shafts were connected underground by an entry, and the air-shaft was on this entry, being 110 yards from the gin-shaft and 175 yards from the steam-shaft. There are five different openings, two of them are used as hoisting-shafts, one as an air-shaft, and the other two were claimed to be escape-shafts, but I could see no way provided at either one for men to escape. Both of the hoisting-shafts were without covers on the cages, gates on the landings or any protection around the top of either. I notified the superintendent of the condition of his mine requesting covers on the cages, and gates on the landings, and also requested him to apply some other method of ventilation, as the basket which was in use could not create heat enough to cause a circulation of air through the mine of sufficient volume to supply the number of men that would be employed when the water was gotten out of the mine. One great trouble with the present plan of ventilation is that the air-shaft is sunk down in the hollow while the hoisting-shaft stands on top of the hill, some forty or fifty feet higher than the top of the air-shaft or upcast, and the pressure of the atmosphere would be greater at the lowest opening, which would be the top of the upcast shaft. Consequently it would take considerable force to overcome the difference in the pressure of the atmosphere, as what difference there is against the force now employed, viz., fire in a basket in the shaft.

All of the other mines are operated about the same in this county. Samuel Moore has a shaft fifty feet deep. Charles G. Rowen has a shaft forty-nine feet deep; no covers on the cage, no gates on the landing and no ladders on the escape-shaft. Henrick Milky's shaft is thirty five feet deep. Robert Williams's shaft is seventy feet deep. John D. Morris's is thirty-five feet deep. John Murry's shaft is sixty-four feet deep. Frank Cooper and Mike Luddon have a slope. Anthony McGarney's shaft is sixty feet deep, etc.

JASPER COUNTY.

JASPER COUNTY MINE.

Robert Davidson, proprietor, Newton. This mine is situated three miles south of Newton; has a capital invested of $1,000, opened by a shaft, using a one-horse gin for hoisting the coal. The mine is worked with room-and-pillar, single entry. The coal is weighed on wagon scales. At the time of my visit twenty men were employed; the capacity of the mine was forty tons per day; the air-ways were driven five and a half feet in height and six feet wide. The air-shaft is three feet in diameter and thirty feet deep, ventilated by a furnace two and a half feet wide and twenty inches high. The full volume of air was 1,200 cubic feet per minute. There were twenty-five working rooms, with a gauge of track of twenty-three inches. The capacity of the mine-cars was 800 pounds each. The air-shaft is situated about 100 feet from hoisting-shaft. The escape is through an old slope opening, which is four and a half feet square. This mine had no covers on the cages, and no gates on the landings, and the slope used as a man-way, or escape, was almost full, in places, of dirt which had washed in from the surface by the rains. The mine was poorly ventilated. One reason was that the furnace was too small, and another was that the air was passing in at the slope, and going directly to the furnace, and in building the furnace the builder had sunk into the bottom to make room for it, and the dirt taken out had been thrown into the air-way leading to the furnace until this air-way was almost full of dirt. Then there was a pumping-shaft, which was also a downcast for the air, and all the air that passed down it went directly to the furnace. Consequently there was not much air passing down the hoisting-shaft, and there was no way of using the air that passed into the mine from any other source than at the hoisting-shaft. I notified the proprietor of the condition of his mine, requesting covers put on the cages, gates put on the landings, the air-ways cleaned out, a double door hung on the man-way or slope, and a new stack built on top of the air-shaft, not less than twenty-four feet in height. This mine has never before employed so many men in the summer time, but the railroad mine was abandoned this spring, so that this mine got a railroad contract for all the coal they could produce.

The county has twenty-three mines in operation, and most of them employ ten or fifteen men in the winter season. Henderson W. Johnson has a shaft seventy-five feet deep, situated five miles northwest of Colfax. He had no covers on the cages, no gates on the landings, and no escape for the men in case of accident at the hoisting-shaft, and the rope used in the north side of the shaft was condemned. I notified the proprietor of the condition of the mine, also stated that I did not consider the boiler safe, and would not consent to it being used until tested by a practical boiler-maker. If he pronounced it safe, I would withdraw my objections.

BLACK HEATH COAL COMPANY

Has a shaft situated about half a mile south of Johnson's mine. This mine is operated by a slope, using a steam engine of twenty-horse-power. There is no escapement for the men, and the drag in use behind the loaded cars in the slope, was not large enough to hold the cars from running back should anything break.

THE FITZHUGH MINE

Is only a short distance east of the mine above referred to, and is operated by a shaft fifty-five feet deep.

Gede Beiley and Scott Slaughter have each a mine situated three miles east of Colfax.

All of these mines above referred to work a large force of men in the winter season, farmers coming after coal for fifteen or twenty miles, and as the country is thickly settled, there is quite a large demand which the mines have to supply.

There are several mines south of Newton within five miles of the town. There are also a number of mines east and north of Monroe, all of them drift openings; but the majority of them have been sold to some organized company, whose name I have not learned. This company intend running a railroad track from the road running from Newton to Monroe to connect with the mines and ship their coal on the cars. This will in all probability develop quite a good vein of coal in this locality, better, perhaps, than has heretofore been thought of, as there has never been any very extensive mining done in the vicinity of Monroe.

APPANOOSE COUNTY.

I visited the mines of this county on my second tour for the year in June, 1881. The mine of the Centerville Coal Company, John T. Henderson, superintendent, I visited last fall and requested some improvements, such as covers on the cages, gates on the landings, and an escape-shaft for the men in case of accident at the hoisting-shaft. When I visited it on the 6th of June, I found the improvements all made except the escape-shaft, which they had commenced. I had the force reduced to ten men until the linking the escape-shaft was finished. I also found on examination that the partition dividing the hoisting-shaft from the air-shaft was not as tight as it should be, and requested a new partition put in. I again visited the mine in July and found the escape-shaft completed, with the exception of the ladders and the partition between the hoisting-shaft and the air-shaft was made new; and things now begin to look in some shape. I requested that four doors be hung to force the air through the mine, and as the escape-shaft was the downcast for the air, the upcast being joined to the hoisting-shaft, there was no danger to the miner if fire should occur at the hoisting-shaft; so I let them resume work with the full force of men with instructions to provide a way for men to ascend at the escape-shaft as soon as possible. Twenty-three miners are at work. The mine is in better condition than when I first visited it, and now double entries are being driven, and if they are continued, the mine will soon be brought into good condition.

THE CO-OPERATIVE COAL COMPANY.

This company's mine is situated at Brazil, five miles west of Centerville. C. Carmin is president, and A. C. Andrews, secretary; post-office, Brazil. The mine is operated by a shaft sixteen feet deep using a one-horse gin, with a capital of $1,400 invested. The mine is worked with room-and-pillar with single entry. The coal is weighed on small scales before being screened. Fifteen men were employed at the time of my visit; the capacity of the mine was seventy-five tons per day; and the air-ways were driven four and one-half feet in height and eight feet wide. The air-shaft is three feet square and thirty-one feet in height. There were fifteen working-rooms with a gauge of track of two feet and seven inches. The capacity of mine cars was eleven bushels. The air-shaft is situated 200 feet from hoisting-shaft. The escape-shaft is the furnace-shaft, with a ladder in it. There were no covers on the cages and no gates on the landing. I notified the president of the condition of the mine and the requirements of the law. I again visited the mine in July and found the improvements that I had recommended made, except the covers on the cages; and as the cages were not used for hoisting or lowering men, the law does not require covers. The shaft is only sixteen feet deep, and the men climb the partition coming out of the mine, and slide down the rope going in. This mine is operated by a company of miners. There were fifteen men when the company was organized, but there are now only seven. The president of the company is one of the number, also the secretary and pit-boss. They had to build their own side track and open up the mine under the usual disadvantages of workingmen without money, as well as to overcome the opposition of competing operators; but pluck and hard work has prevailed, and they now have a mine in condition to load considerable coal, and if properly managed it will compensate the men who, by their labor and perseverance, have merited the patronage they now have. They intend to make some more improvements outside the mine in the way of new dump-buildings, etc., which would add greatly to their ability for handling coal cheaply.

THE WALNUT COAL COMPANY'S MINE.

The Walnut Coal Company's Mine at Brazil is operated by a slope, using mule-power. It is worked with single entry, room-and-pillar. The mine is ventilated by a stove, and has a better current of air than any other mine in the county. The air-ways were clean all through the mine with uniformity of size, which always gives good results, and as there were only a few men at work, the volume of air was sufficient, for the men were working only a short distance from the main air-ways.

There is another mine, situated at Brazil, but as it was not working fifteen men at the time of my visit, I did not include it in the list as coming under the law. Both of my visits to Brazil have been in warm weather, and the mines have not been working full force, but in the winter season all three of the mines at this point employ more than fifteen men each. There is a new shaft being sunk just south of Brazil, but I did not learn who the operators were, as they were not working at the time of my visit.

COBB MINE.

I visited this mine June 10th and found it in bad condition. The manway leading to the escape-shaft was full of water, and the ventilation was not good in any place in the mine. The other improvements I had ordered on my first visit, such as covers on the cages, and gates on the landing, were complied with, and the timbering in the main entry was done, with the exception of one or two pair of cross timbers. The condition of the mine at this date was not such as to permit the mine to be operated with by more than ten men, but the superintendent in charge of the mine at the present time had never had any notice thereof as he was not superintendent at the time of my first visit. I requested him to reduce his force to ten men, as required by section fourteen of the mining law. He refused to reduce his force until compelled to, and I concluded I had better give him legal notice of the condition of his mine than to bring suit and have the State thrown into the cost. I gave him notice of the condition of his mine June 10, 1881, and on July 6th I again visited the mine and found it still in poor condition. The water was yet in the manway, I undertook to go through but could not. A boiler and steam-pump were at work at the escape-shaft to take the water out of the mine so that the escape-shaft could be reached, but how much was still in the mine I could not tell, except that there was too much for men to get to the escape-shaft. The ventilation was no better than at my first visit. I gave the superintendent his choice to reduce his force voluntarily or I would commence legal proceedings against him. He accordingly reduced his force to ten men and is now working under the reduced force and will remain so until the mine is properly ventilated.

DIAMOND MINE.

This mine is operated by W. W. Oliver, president, and Alex. Dargavell, superintendent, both of Centerville. It is situated about one half mile east of the town of Centerville. Operated by a shaft. Capital invested $15,000. Gin power is used for hoisting purposes. The coal is weighed on wagon scales. Fifteen men were employed at the time of my visit. The capacity of the mine was forty tons per day. The air-ways are four and one-half feet in height and eight feet wide. The air-shaft is joined to the hoisting-shaft, is sixteen inches wide, four feet eight inches long, and 100 feet in height. Ventilation by a furnace eighteen inches wide and twenty inches high. There were seven working rooms with a gauge of track of two feet seven inches. The capacity of the mine cars is 800 pounds. There was no escape-shaft and only the one opening. There were no covers on the cages and no gates on the landings. I notified the superintendent of the condition of his mine and the requirements of the mining law, and requested the improvements made as soon as possible. This company is sinking another shaft about a mile and a half from town on the line of the southwestern branch of the C., R. I. & P. R'y, which it is hoped to have in operation by the beginning of cold weather. The shaft was sunk about eighty feet when I was there, and it was thought it would be necessary to go about 130 feet from the surface before getting to the coal.

KELLER MINE.

This mine is situated about one mile southeast of Numa, J. H. Packard, proprietor. It was working only a few men, as the demand would not justify it, and it was without covers on the cages had no gates on the landings, and was without an escape-shaft.

There are three other mines in the vicinity of Numa, all about in the same condition, worked on as cheap a plan as possible without any regard to safety, but in the summer time they only work a few men, consequently are not subject to the mining law. This was the case when I first visited the mines in the county. In the winter time, however, some of them worked as many as twenty-five or thirty men. But as a State Mine Inspector cannot visit all the mines in the State, some of them are very likely to evade the law for some time. This county has about forty-four mines and during the summer months there are only about six or seven of them that work over ten men, but in the winter the majority of them work over fifteen and some of them that do not employ over five or six men in the summer work over fifty in the winter. I have notified the superintendents of all the mines of the requirements of the law and requested the improvements made as soon as possible, and further notified them not to employ more than ten men at one time until the improvements were made.

MONROE COUNTY.

THE AVERY COAL COMPANY'S MINE

Is situated about one mile and a quarter east of Avery, Daniel Watson and David Hammond, proprietors, with a capital invested of $12,000. The mine is opened by a shaft ninety-four feet deep, using a steam engine of twenty-five horse-power. It is worked with room-and-pillar, double entry. The coal is weighed on wagon scales. At the time of my visit eighteen men were employed. The capacity of the mine was seventy tons per day. The air-ways were four and a half feet in height and twelve feet wide. The air-shaft is joined to the hoisting-shaft, and is twenty-nine inches wide, six feet long and 115 feet high, from the bottom of the coal to the top of the stack, ventilated by a furnace of eight cubic feet capacity. The full volume of air was 5,000 cubic feet per minute. There were eleven working rooms with a gauge of track of three feet. The mine was deficient in not having covers on the cages, or gates on the landings, and the furnace is too close to the shaft, as the upcast is not protected by being lined with incombustible material. I notified the superintendent of the condition of the mine, calling his attention to these defects, and requesting an escape-shaft sunk as soon as possible, but as the law allows one year in which to make the second opening, the company has until next June in which to comply with my last request, but the superintendent agreed to put one down immediately.

This company has extended the tram-road that formerly belonged to the Union Coal Company down to its mine, and has a small engine for the purpose of hauling the coal from the mines to the railroad. The coal is hoisted out of the mine in thousand-pound cars, then dumped into cars on the tram-road, which hold one hundred bushels, and the engine pushes two of these cars up to the dump at the railroad. The engine handles the coal on the tram-road much more cheaply than was the case formerly when mules were used.

SMOKY HOLLOW MINE.

This mine is situated about two miles and a half from Avery, in what is known as Smoky Hollow. Harry Fisher and William Jamison are the proprietors, and have a capital of $2,000 invested. The mine is opened by a slope, using mule-power. It is worked with room-and-pillar, with single entry. The coal is weighed on wagon scales, hauled in wagons to Avery, and there loaded into the railroad cars. At the time of my visit there were only twelve men employed. The capacity was considered sixty-five tons per day. The air-ways were driven five and a half feet high and eight feet wide, with an air-shaft four feet in diameter, ventilated by a furnace of twenty cubic feet capacity. There were eight working rooms, with a gauge of track of two feet five inches. The capacity of the mine-cars is 1,000 pounds. The air-shaft is 150 yards from mouth of slope, and is also the escape if anything should happen to the slope. The mine is in good condition, and the work is all in good shape; but like a great many other mines, there was no fire of any consequence in the furnace, and the volume of air was very small. If a good fire was kept in the furnace there would be air sufficient for all the men it would be desirable to employ.

There are several other mines in operation in this hollow, but as the coal must be hauled a distance of two and a half miles, they do not run a very extensive business; yet, if some one should run a railroad switch down the hollow, there could, in my opinion, be opened as extensive coal works as we now have in the State. The coal is of good height and splendid quality, and is known to extend four miles south of the hollow where the miners are now working. The coal on the south side of the hollow is not so full of rock as it is on the north side, judging from what observations I could take in the mine.

THE EUREKA MINE OF MONROE COUNTY.

I visited this mine August 17th, and found it in fair condition, with the exception of the west entry, where it was deficient in ventilation. I requested the operators to attend to it at once. The manway connecting the two shafts was not in very good condition, and is about to be made a new one, so it will stand. One of the parties was working longwall, and when the slack work came the longwall workings caved in and damaged the manway connecting the shafts. The companies are building a tram-road from the mines to the railroad track, intending to use a drum on top of the hill and have the loaded cars pull the empties back up the hill, with a switch in the center where the full cars and the empty ones will pass. The grading was nearly all done and most of the ties in place. The owners intended getting their iron and cars for the tram-road of Fix & Postlewait, of Happy Hollow, as the old Happy Hollow Mine is wrought out, the track taken up and the whole thing abandoned on account of coming into a very large fault.

KEOKUK COUNTY.

This county has some splendid coal, but has never been very extensively developed, for the reason that until lately there has been only one railroad and that an east and west road. Now since the B., C. R. & N. has come into the county, the county has a northern market, and some splendid coal is being developed. Although coal has been produced in the county for years, there never were any very extensive works until the Starr Coal Company commenced operating at What Cheer. This company have two mines in operation. The Starr shaft, before referred to in my report, is now working 180 men. Their full volume of air is 13,440 cubic feet per minute. When I first visited this mine I requested the company to put covers on the cages and sink another shaft for an escape-shaft, as the one it had was only thirty-seven feet from the hoisting-shaft instead of fifty feet of natural strata, as required by law. As the company had no suitable place for an escape unless another was sunk close to the one already there, by agreement the company was to work its first south entries day and night until they connected with an old shaft, which was to be timbered and used for an escape. On examination I found by opening the doors at the bottom of the shaft, the air could be reversed and made to travel up the hoisting-shaft, and, as a steam jet was being used, if the steam were shut off the underground workmen would be in no danger of suffocating in case of fire. Sometime during the winter the stove in the dump was thrown over, setting the building on fire, and the whole thing--engine room, dump and all—burned while the men were in the mine, and nobody was hurt. The men could not get out, as the heat from the burning building was so great they could not stand at the top of the escape-shaft, which was thirty-seven feet from the hoisting-shaft, flanked on the east by the engine house; but if the distance had been fifty feet, as the law provides, it would have been no better for the men, as the thirteen additional feet would not have made it enough to permit the men to escape. The buildings are all rebuilt now, and a new escape is almost completed, situated about 250 yards from the hoisting-shaft.

The B shaft, belonging to the same company, has the mine opened in good shape with double entries. This mine is situated about one mile north of What Cheer. At the time of my visit it was using gin-power for hoisting the coal. The dump-building and machinery at this shaft would have been all up before now, but when the fire occurred at the other mine the company moved the dump building and machinery from the new shaft and put them at the old shaft. The new one has twenty-four men, all of them employed driving narrow work, so that when the machinery is in place there will be ability to give employment to about 125 miners. The present capacity of the mine is seventy tons per day. There are seven cross entries driven six feet high and eight feet wide, with an air-shaft six by eight feet, ventilated by steam. The full volume of air is 2,016 cubic feet per minute. The air-shaft is situated 118 yards from the hoisting-shaft and is also used as an escape-shaft.

ROSETTA MINE.

President, E. N. Cook, of Muscatine; superintendent, W. W. Creeg, of What Cheer. There is a capital of $50,000. The mine is situated about one mile northwest of What Cheer. It is opened by a shaft. It is intended to make use of a double engine of sixty horse-power for hoisting the coal. At the time of my visit they were just raising the new dump and had only four men in the mine. The air-ways are five and one-half feet high and eight feet wide. The air-shaft is six by twelve feet, and situated 150 yards from the hoisting-shaft. The escape-shaft is six feet square, fifty-two feet deep, and is joined to the air-shaft. The mine was ventilated by a furnace of ten and one-half cubic feet capacity.

MUSCATINE MINING AND COAL COMPANY.

President, P. M. Musser, Muscatine; superintendent, F. M. Witter, What Cheer. This mine is situated two miles northwest of What Cheer, and is opened by a shaft. It has a capital of $50,000. The mine is worked with room-and-pillar with double entry, using a one-horse gin for hoisting the coal. There were twenty-one men employed. The capacity of the mine was thirty-five tons per day, the air-ways are driven five and a half by eight feet, the air-shaft is five feet by ten, and seventy feet deep, ventilated by a basket; full volume of air 2,988 cubic feet per minute. The air-shaft is situated 200 yards from the hoisting-shaft, and is also used as an escape-shaft. This company is making arrangements, too, for using steam-power as soon as their dump-buildings and outside improvements can be completed. The side track from the railroad is partly graded, and their calculation is to be prepared to hoist coal by steam and load it into the railroad cars at the dump by the middle of October. The company is driving its narrow work under ground as fast as possible so as to be able to employ as many as the demand for coal will warrant, as soon as the improvements are completed. There are other mines in this county that employed over fifteen men last winter; but, as both of my visits have been in warm weather they, at that time, were employing only a few men.

POLK COUNTY.

PIONEER COAL MINE.

May 10th I visited the Pioneer Coal Mine. Wesley Redhead is president, and James P. Clark, superintendent. Thirty-two men were employed, twenty men working day-shift, and twelve at night. The full volume of air was 8,400 cubic feet per minute. It was properly conducted to the men at their different working places. Most of the men were working in the entries and air-ways. The company gave, as a reason for this that it intends to have plenty of work opened out so that when the rush of work comes in the fall it will have room for all the men it wants. There were only a few rooms working, and some of them would soon be wrought out.

EUREKA MINE.

May 12th I visited the Eureka Mine, Norman Haskins, president; and James Cormack, superintendent. There were twenty-one men employed, with a full volume of air of 7,755 cubic feet per minute. The air was well conducted to the different working places of the mines, with the exception of the southeast part of the mine, where the leakage of the air through the doors made the ventilation deficient at the working places. There were some old works in which considerable carbonic acid gas had accumulated which was being carried to the men. I requested the superintendent to have the leakage of air through the doors stopped, and to build stoppings to prevent the escape of the carbonic acid gas from the old workings.

ECLIPSE MINE.

This mine had twenty-eight men employed, with a full volume of air of six thousand three hundred and seventy cubic feet per minute. It was well distributed through the works. The mine was not working while I was there, and the foreman said that when the mine was not working not much attention was paid to the furnace.

THE POLK COUNTY MINE

Had twenty-two men employed. The full volume of air was seven thousand six hundred and eighty-eight cubic feet per minute. The doors and brattices were not in good repair, as there was a leakage of four thousand nine hundred and eighty-six cubic feet of air per minute. One of the covers was off the cage. I notified the superintendent of the deficiencies, requesting that they be attended to immediately.

WALTERS AND GARVER'S MINE

Had eighteen men employed, with a full volume of air of two thousand eight hundred and eighty cubic feet per minute; but there was nothing on the entries to turn the current of air into the working places of the men, and no rooms where the second cross-cut had been made; the old one had not been stopped up. I requested the boss in charge of the mine to have the improvements made as soon as possible. On my first visit to this mine there was only one opening, but now the proprietors have the second shaft, just fifty feet from the hoisting-shaft. They worked only twenty men at a shaft, according to the mining law, until they had the second opening. This was quite a hinderance when the demand was so heavy as it was last winter.

WATSON MINE.

This mine had twenty-eight men employed, with a full volume of air of three thousand one hundred and fifty cubic feet per minute, but the air was poorly conducted. At several of the working places the men were compelled to work in very impure atmosphere. I requested a door hung on the mouth of the first room on the north entry, a break-through between the first and second room, and a door hung on the mouth of the second room, also a break-through made from the second north entry on the right side into the second room, in order to conduct the air to the men who were driving the entry. I notified Mr. Ford of what I wanted done, and that it was strictly necessary that it should be done immediately.

JEFFERSON COUNTY.

I visited the mine of the Jefferson County Coal Company, at Perlee, May 20. Their escape-shaft was completed, and the basket for ventilating the mine had been done away with, and a steam jet was being used. The full volume of air was seven thousand three hundred and eighty-seven cubic feet per minute, but the door on the main entry, to turn the air into the workings of the mine, was not in good repair, and was leaking five thousand eight hundred and forty-two cubic feet of air per minute, and not only so, but when the door was opened the full volume of air rushed down the main entry to the return air-course, and thence direct to the upcast, and thus was no benefit to the men. I requested another door hung on the main entry far enough from the one already there so that the train of loaded cars could stand between the two, and one of the doors be shut against the volume of air, and I requested a door hung on the east entry, to turn the current of air into the rooms where the men were working the coal. After it is brought on the main entry the coal is pulled by steam to the bottom of the shaft by a rope attached to the engine. Four cars can now be hauled to the bottom of the shaft, but when mules were used on the main entry they could take only one car at a time, and this was very hard on the mules, as the grade was so steep.

May 21st, I visited the mine of the Washington Coal Company, at Perlee. This company had got its escape-shaft completed, and had the ladders in good shape. The full volume of air was six thousand one hundred and twenty cubic feet per minute, but the leakage of the doors and brattices allowed the current to escape so that by the time it reached where the men were working, the volume was reduced to two thousand seven hundred and thirty cubic feet per minute. I requested a door hung on the entry to turn the air into the rooms. There was sufficient air for the men employed, something I had never found before on visiting the mine. On going to the furnace I found a pit-car full of props and fine wood had been taken in, I suppose for my benefit in giving the superintendent notice of the condition of his mine. I called his attention to the matter of fuel for his furnace, stating that I considered bank-timbers were very expensive to be used as fuel in a furnace in a coal mine, but in my opinion, could I have slipped into the mine the next morning, I would have found a fire made of lump coal, and very likely a poor fire at that, with the volume of air reduced accordingly.

DALLAS COUNTY.

The miners of this county have not been visited since last winter, as there is only one mine that works any quantity of men; that is the mine at Van Meter, and it is being worked with a reduced force on account of having only one shaft or opening. The mine is working day and night with ten men employed on each shift. The company has the Iron-miner in this mine, which enables them to produce considerable coal with the men they have employed; but considering the machinery the company has at this mine, it hardly pays to run it with ten miners. After the engine house and dump-building burned last fall, the company put in all new machinery and an extra engine for running the air compresser; and Mr. Platt, the president of the company, told me some time since he thought the escape-shaft would be completed by the first of October. As soon as this was done he would want about 125 more miners. A portion of the mines he intends opening out longwall enough to give employment to about eighty men; the balance of the mine will be worked with room-and pillar.

STATISTICS.

It will be noticed that there are twenty-one counties included in my report, and there are nine others producing coal, but without mines, coming under the mining law. In the thirty coal producing counties of the State there are over 400 mines in operation. The larger number of them I have visited, not knowing their capacity until I found out by going to them. Some of the mines which employ only three or four men in the summer time, in the winter employ as many as sixty men in the rush for coal. Then while the large mines fail to furnish coal to supply the demand, all the small mines along the line furnish coal by hauling with wagons and shoveling into the railroad cars at the different stations. Marion, Mahaska, Monroe, Appanoose, Boone and Webster counties have a great many mines that haul their coal to the railroad in wagons, and in fact all the coal producing counties have mines that keep no account of the coal mined nor the amount shipped after they get the money for it; consequently in gathering the facts in regard to the total annual out-put of coal for the State, the true amount cannot be ascertained, and some of the large companies refuse to report the amount of coal mined at the mines; but from what I can find out while visiting the different mines, I believe I have made a pretty correct estimate by putting the total annual out-put of coal for the State at 3,500,000 tons.

I will here state a proposition which seems to me to be one of great importance, not only to the mining community, but to the whole State. Our coal-fields are a monopoly to the State and of immense value to her prosperity; they constitute a source of wealth of more value to Iowa as a State, than the ability to draw at pleasure from some foreign source (if such were possible) an amount of gold equal to the total annual value of her coal trade. Therefore anything that depreciates this source of wealth depreciates to the same extent our source of income. A keeper of records of our mineral wealth is consequently as necessary as her secretaries. The mining and manufacturing interests of our State in the near future are going to become the paramount sources of her industrial and progressive wealth, and in order to render them available and lasting they should be economized. This cannot be done without some system of encouragement to their development and of protection against waste and ignorance. A faithful record of the progress of the trade and the development of our mineral wealth and the statistical returns of the same, would not only be useful and instructive to the miner and the manufacturer, but would display to the capital of the world inviting fields of enterprise. A bureau of reference should be established where the plans of all our mines would be filed yearly and the ventilation of our mines should be exhibited and compared in such a manner that errors could be detected and corrected. The experience of the whole State might be gathered together by the keeper of mining records, and all that practical skill, invention, and science have done for one may be made available for all. The State is very careful in gathering the agricultural statistics; then why not look as well to the mineral product and ascertain the amount of wealth that is brought to the State therefrom?

REVIEW.

In Iowa that group or series of strata known as the coal-measures, is probably from 300 to 500 feet in thickness. Although the coal-measures are generally spoken of as lying horizontal, there is a general inclination or dip to the south and west, or more properly towards the southwest. There are many places where, in limited districts, the strata may seem to be horizontal, or may even show an inclination or dip to the east, but the general tendency of all the coal bearing, as well as other formations, is to dip to southwest. Geologists have divided the coal-measures of Iowa into three groups, viz., the upper, middle and lower coal-measures. Each of these coal-measures embrace a great many strata of various formations of rocks that are usually associated with the seams of coal of the particular measure to which they belong. The strata belonging to our coal-measures are a succession of sandstone, limestone, sandy shale, carbonaceous shale, marl and coal. In some places the coal-measures are barren of any seam of coal of sufficient thickness to be worked with profit, and in some places the coal is wanting altogether; but as a general rule each of these measures carries a seam of coal that is one of the chief characteristics of that measure wherever it may exist. The upper coal-measure lies wholly to the southward and westward of the Des Moines River. The eastern or outcropping edge of this upper-coal measure may be approximately traced by a line drawn from about the center of the county of Appanoose, in the southwestern part of the State, northwestwardly through Chariton, Guthrie Center and Audubon. Therefore its position is wholly in the southwest part of the State. This measure consists principally of limestone, with some fine-grained sandstone, marly shale, and coal. This coal-measure carries only one seam of coal, which averages about eighteen inches in thickness.

The middle coal-measure projects northwestwardly an average of say twenty-five miles beyond the edge of the upper one, and the lower coal-measure, occupying the region of the Des Moines River, some fifty miles in width, and following the river through the counties of Webster, Boone, Dallas, Polk, Warren, Marion, Mahaska, Wapello, and Van Buren. This coal-measure contains all the larger beds of coal, and in fact about all the coal of any consequence there is in the State. The eastern edge of the lower coal-measure, and also of the coal field of the State, extends from the southeast corner of Van Buren county north, lapping over into Lee county, in places a distance of four or five miles, running north through Jefferson and Henry counties in the same manner, extending into Washington county to a point on Crooked Creek, close to the southwest corner of Franklin township, following the creek northwestwardly some fifteen or twenty miles and about three miles west of the city of Washington, thence west to the east line of Keokuk county, thence following almost a direct course to the Iowa River at the point where the river crosses the east line of Marshall county, thence up the river to a point about two miles below Iowa Falls, then west to the north line of Webster county, following the line as above described, and the northern and eastern boundaries of the coal-measures will be found. North and east of the line it is useless to look for coal in Iowa, with the exception of the small deposit in Scott county, eight miles west from Davenport, and from two to three and a half miles north of Buffalo, where there is a small district of almost one township which bears a seam of coal averaging about three feet in thickness. In this district are located ten mines, one slope, and mine-shafts. The deepest one is sixty-four feet. The mines in this locality give employment in the winter season to about one hundred and twenty-five men. This pocket of coal is not connected with any other portion of the coal field of the State, as the subcarboniferous rocks come to the surface between this body of coal and the Iowa coal field, as above described; showing that there can be no connection between the two.

LEE COUNTY,

Although spoken of as being in the coal field, must not be considered a coal-producing county. Although the coal-measures extend a short distance into the west edge of the county, there has never been any coal mined in the county, and it would be useless to look for coal, except in the extreme northwest corner.

HENRY COUNTY

Is situated, in regard to the coal field, about the same as Lee, although there are some mines operated by drifts in the winter season at Hillsborough, in Salem township, but they are operated only to a very limited extent for local trade.

WASHINGTON COUNTY

Has the coal-measure extending over more territory than either Lee or Henry county, but the measure is considered barren of coal, there never having been but one mine in operation in the county. That was one in Franklin township, about six miles southwest oı Washington, and was a small pocket of coal about two feet in thickness.

VAN BUREN COUNTY

Is almost entirely underlaid by one or more seams of coal, ranging from two to four feet in thickness, but owing to the position of the county in relation to the general coal field it does not find any considerable market outside the local trade, as coal can be got as cheap further north or west, without the expense of transportation. For this reason the resources of the county have never been developed. The county has some mines in operation, the most important being near Farmington. They range in depth from thirty to seventy feet. Some are opened by drifts, but none are worked extensively. They are eight in number, and give employment to about forty-three men.

JEFFERSON COUNTY.

The most important mining locality is at Perlee, where there are two shafts in operation that produce over half the entire product of the county. This county is situated similarly to Van Buren county and for that reason its coal is not mined extensively at the several places where mines have been opened. The coal of this county on an average is about three feet in thickness, but in some few places it reaches a thickness of five feet. There are mines in operation in several places in the county, but none worked so extensively as those at Perlee. There are twenty-two mines in operation, giving employment to 218 men.

DAVIS COUNTY

Is known to contain large quantities of coal, but the demand is very light. Wood is very plentiful and is used by a large majority of the citizens for fuel. Consequently the coal has never been fully developed. There are eleven mines in the county which give employment to eighty-five men.

WAPELLO COUNTY

Is well supplied with coal. There are three seams of coal in this county the first seam or number one is very thin, averaging about eighteen inches in thickness. The second seam is the one mostly worked, and is the best seam of coal the county has. This seam varies in thickness in different localities. There are twenty-seven mines in operation, most of them located around Ottumwa and Kirkville and along the river from Eddyville to Ottumwa. Near Eldon the seam is three and one half feet thick. At Kirkville it reaches a thickness of six feet. Although abundantly supplied with coal the resources of the county have never been developed. The mines at the present time are operated almost exclusively to meet the local demand. Of the twenty-seven mines in the county the majority of them work only three or four months in the winter, and the rest of the year they are idle. The mines now in operation give employment to 337 men, but if the county had a railroad in the proper place to suit the coal it would soon have mines that would compare favorably with any in the State.

KEOKUK COUNTY

Is on the extreme eastern edge of the productive coal fields in central Iowa. The seam, which is from five to seven feet in thickness at What Cheer and extensively worked there by several mines, crops out on German Creek, some four or five miles east. The discovery of coal at What Cheer, in any considerable deposits was quite a surprise, as geologists discouraged the hope of any such discovery. There is one peculiarity in the deposits of coal in the different counties in the coal field east of the Des Moines River. Coal is more liable to be found bordering on streams emptying into either the Des Moines, Skunk or Iowa River. Those prospecting meet with better success close to the stream than back on the high lands two or three miles, even though the stream be nothing but a very small creek. The same seam of coal that is being worked at What Cheer is also being worked eight miles south, and about one mile south of Delta; and it undoubtedly extends westward and southward until it connects with the Mahaska and Wapello coal field, subject, however, to faults and thinouts, as I do not believe there is any seam of coal in the State that holds its thickness for a mile in any given direction. There are twenty-two mines in the county giving employment to 476 men.

MAHASKA COUNTY

Is the heaviest coal-producing county in the State. This is because the Central Railway of Iowa has given it a direct market north into a country entirely destitute of coal. The second seam of coal is being worked. This varies in thickness from three to seven feet, and is heaviest along the small streams, tributaries of the Des Moines and Skunk rivers. There are forty-eight mines in operation in the county, that give employment to 943 men. The largest mines are those of Excelsior and Muchakinock, which produce the greater part of the coal mined in the county, although the new mines opened on the Muchakinock Creek, west of Knoxville Junction, bid fair to rival those of the above named places. Here, the same seam of coal, which is over six feet in thickness and of good quality, is being worked. Most of the mines in this county are worked by drifts, as the seam they are working lies considerably above the level of the Des Moines River, and the small streams have cut their channel through the coal-measure far enough to leave the coal exposed, or lightly covered by soil, in the sides of the hills bordering the streams, and is so easy of access that there has been very little effort made to test the lower seam, which crops out in the Des Moines River some four miles above Eddyville, and can be found along the banks of the Little Muchakinock Creek fourteen feet below the second seam of coal.

APPANOOSE COUNTY

Has a seam of coal which averages three feet in thickness, and extends with more uniformity over the county than the coal of any other county in the State. There are a great many small mines in the county that are operated for local trade. Centerville is the center of the mining industry in the county; there are seven or eight mines in operation within one and a half miles of the center of town. They are shafts from forty to one hundred and fifty feet deep. There are forty-four mines in operation in the county, giving employment to 387 men.

MONROE COUNTY,

Like Appanoose, has several small mines which are located along the creeks back from the railroads. The largest mines are located at Albia, Avery, and Fredric on the C., B. & Q. R. R., and at Coalfield and Hickory Grove on the Central R. R. of Iowa. There are thirty mines in operation in the county, giving employment to 638 men. The deepest shaft in operation is at Albia, and is 150 feet deep.

MARION COUNTY,

Although not the heaviest producer in the State, undoubtedly has the heaviest deposit of coal in the State. Flagler is the heaviest producing point in the county, although at Marysville, a small town on Cedar Creek, there are several mines in operation. One of them, a short distance west of the town, has a thickness of coal of almost twelve feet. All the mines on Cedar Creek are worked drifts. On Whitebreast Creek, in the north part of the county, the coal is exposed along the bank, and at a point about two miles north of Knoxville a four-foot seam of coal is exposed for a distance of half a mile; and at Coalport, about four miles further north, there are two seams of coal, the first and second seam being both exposed in the river bank above the level of the river. There are mines in almost every township in the county, and there is every indication that the entire county is underlaid with coal. But the resources of the county have never been developed owing to the fact that it is surrounded on every side by other coal-producing counties; and as it has no east and west road extending through the State the counties north and south intercept the coal trade in supplying the northern and western portions of the State that are destitute of coal. The demand on the Marion county mines is therefore almost wholly confined to the county. Some of the mines along Cedar Creek and at Marysville haul coal in wagons to the railroad in the winter season. There are forty-six mines in the county which give employment to 295 men.

JASPER COUNTY

Produces considerable coal. The most important mines are distributed along the valley of the Skunk River, from a point about four miles northwest of Colfax, to Reasnor Station, on the Monroe Branch of the C., R. I. & P. Railway. There are also some mines about three miles east of the town of Monroe, to which a tram-road is in process of construction, with the intention of increasing the capacity of the mines, which heretofore have been operated only for local trade. The mines throughout the county are equally divided, half shafts an half slopes. The locality having the heaviest production is along the railroad about four miles south of Newton, where there are several mines in operation. The twenty-two mines in the county give employment to 170 men.

MARSHALL COUNTY

Has one mine located about four miles northwest of Albion, on the west side of the Iowa River. The discovery of coal in this county is of recent date, and the mine has never been worked to any extent, it giving employment to only fourteen men. The coal at this mine is about three feet in thickness.

HARDIN COUNTY

Is on the extreme northeastern border of the coal-field on the Iowa River, a few miles north of Eldora. The three seams of coal belonging to the lower coal-measures are found here, but they are very much thinned out, and lie in basins, or pockets, so that their thickness is very irregular. The thickest coal to be found is in Chaffin's Mine, where in places it reaches a thickness of six feet; but that is an exceptional case, most of the coal averaging about two feet in thickness. Coal commands a higher price at the mines here than at any locality in the State; but the irregularity of seams, and the trouble from water, cause the operations of mines in this locality to be very expensive. There are four mines in operation in the county, giving employment to thirty eight men.

HAMILTON COUNTY

Has some mines in operation at Homer and a few other points in the county. The coal so near the northern edge of the coal field is always found in basins, or pockets, and in this county the basins are small, except, perhaps, in the southwest corner, where some good marketable coal may be found. There are four mines in operation in the county, giving employment to thirty-five men.

BOONE COUNTY

Has two seams of coal that are being worked extensively at Boonsboro by shafts. Here the coal-seam is about on a level with the Des Moines River, but in order that the coal may be brought to the surface where it could be loaded into the railroad cars without hauling in wagons, shafts have been sunk from the top of the bluff a distance of 243 and 345 feet, respectively, the deepest shafts in the county. There are extensive mines in Moingona, on the river, at Coaltown in the southwest corner of the county, and at Zenorsville, in the northeast corner. There are twenty-seven mines in operation, giving employment to 395 men.

WEBSTER COUNTY

Has the most northern mines in the State. The principal seam of coal varies from three feet to five in thickness, at the different mines, although in some places the coal reaches the thickness of nine feet; but the average is about four feet and a half. The most important mines are at Coalville, seven miles south of Ft. Dodge, where the Ft. Dodge Coal Company is operating on a large scale; besides other companies that have recently opened up mines on the west side of the river, since the building of the Minneapolis & St. Louis Railroad, which gives them a direct northern market by rail. The next important mining locality is at Lehigh (also on the Des Moines River), which is exclusively a coal mining town. A railroad is built from Judd Station, on the Illinois Central, to Lehigh, for the purpose of bringing out the coal. This railroad is owned and operated by the Crooked Creek Coal and Railway Company. There are twenty-eight mines in the county, giving employment to 390 men.

WAYNE COUNTY

Has the same seams of coal that are worked in Appanoose county. Mines are in operation on the southwestern branch of the C., R. I. & P. Railway, at Kniffin and other points in the county; but they are all worked in a small way, and some not operated at all in the summer. There are seven mines in operation in the county, giving employment to forty-three men.

LUCAS COUNTY

Has the largest mine in the State, one employing more men than any other one opening. This is the mine of the Whitebreast Coal Company, at Cleveland. This company uses the electric light for lighting the works, the only one in use in the State at any mine. There is another shaft at Cleveland known as the Co-operative shaft. It is the deepest in the State, being 285 feet deep, but it has never been operated to any extent. The Farmer's Co-operative Coal Company, at Russell, has a shaft of considerable capacity; but the mine has never been worked to any extent. There are thirteen mines in the county, giving employment to 576 men.

WARREN COUNTY.

The seams of coal worked in Warren county are much thinner than in Marion county. The surface seam, which is worked by drifts in the vicinity of Lacona and Indianola, is only about twenty inches thick; but it is worked to considerable extent in order to supply the local demand. The second seam, worked by a shaft fifty feet deep at Summerset, and by a slope at Ford's Station, on the A., K. & D. Branch of the C., B. & Q. R. R., near the Des Moines River, and in other places in the county, is three feet six inches to four feet in thickness, while in Marion county the same seam of coal is from five to seven feet in thickness. There are sixteen mines in the county, giving employment to 109 men.

POLK COUNTY.

The coal product of Polk county is increasing rapidly, although it is not so large as the coal traffic in the city of Des Moines would indicate, as much of the coal consumed is brought from other places. Some of the coal mined in Warren county is consumed in the city. All the mines of any note in Polk county are concentrated immediately around the city, and some are within the corporation limits. The three seams of coal belonging to the lower coal-measures are all worked in the mines around the city; but the majority of them are working the second seam, although at a greater depth than the third seam, or what is generally called the lower vein coal, is found, which is being worked extensively by the Pioneer Coal Company at its mine, south of the Raccoon River. The coal in the mines around the city of Des Moines averages a thickness of about four feet, although Walters & Garver, in their new mine, operating the second seam of coal, directly east of the new capitol, have coal a thickness of six feet. There are twenty-two mines in the county, giving employment to 385 men.

DALLAS COUNTY.

The only important mine in this county is at Van Meter, on the C., R. I. & P. Railway, where the Chicago & Van Meter Coal Company is working a three-foot seam of coal 256 feet below the surface. There are nine mines in the county, giving employment to

120 men. The small amount of men reported is caused by the mine at Van Meter having to work under a reduced force the past year. This mine alone at times employs over 100 men, but as it had only one opening the company was compelled under the law to reduce its force to ten men.

GREENE COUNTY.

The mines of Greene county, like those of the southwest corner of Boone, are operated by shafts from forty to seventy feet deep, working the same seam of coal. Some of the mines in Greene county have been worked extensively in order to supply the local demand. There is a fine deposit of coal, but it has only lately been discovered. It is now, however, being rapidly developed. There are nine mines in the county, giving employment to eighty-five men.

GUTHRIE COUNTY

Has some small mines operating in a seam of coal belonging to the middle coal-measure. The coal varies from sixteen inches to two feet in thickness. It is of an entirely different quality and is of a different seam of coal from any worked east or north of it. Several mines have been opened in different places in the county. Some have been worked for several years to supply the local demand. There are seven mines in the county, giving employment to forty men.

TAYLOR COUNTY

Has four mines in operation at Hawleyville, on the west fork of the One-hundred-and-two River. The coal is about eighteen inches in thickness. This seam belongs to the upper coal-measures. The mines are not worked very extensively, all the coal going to the local trade. The four mines give employment to thirty-five men.

PAGE COUNTY

Has several mines. Two miles south of Clarinda there are some mines operated by shafts from fifty to sixty feet deep, reaching the same seam of coal worked in Taylor county; and farther down the Nodaway River there is a shaft 120 feet deep. All the mines in Page county are operating the same seam of coal. There are seven mines in operation, giving employment to seventy-four men.

ADAMS COUNTY

Has several mines in operation close to Carbon and Quincy, and one at the northern edge of the county, all operating in the seam of coal belonging to the upper coal-measure. There are thirteen mines in the county, giving employment to 176 men.

It will be noticed from the above review, that the State of Iowa will in the near future become a mining State of no small magnitude. A few years since the State was considered to have no coal to amount to anything. At the present time there are in the State 457 mines in operation, giving employment to 6,174 men, and producing annually over 3,000,000 tons of coal. Within the limits of the Iowa coal fields there are thirty-eight counties, of which twenty are producing coal to a greater or less extent. The mining industry of the State has become one of considerable magnitude, and also a great source of wealth. The coal seams are being developed as rapidly as railroad transportation can be obtained; a great many new mines are being opened, and yet the prospecting goes on, and every indication leads to the belief that the State will double her present number of mines, as well as her mining population, in a few years. It therefore becomes necessary for our lawmakers to become acquainted with the miner, and ascertain his wants and necessities, for with the development of our coal mines comes the necessity for legislative supervision in the interests of the underground workmen. A step in the direction suggested was taken in the passage of the act to regulate mines and mining—chapter 202, acts of Eighteenth General Assembly, which I find deficient in some respects; although the law contains some useful and necessary provisions for the protection of the health and safety of the underground workman; and in some respects these fall short of what they were intended to do.

Generally speaking the public has no patience, and seldom any sympathy, with miners in their numerous strikes and disputes with their employers about wages, and regard as the height of foolishness the policy which seeks redress for grievances through strikers; but it must be taken into consideration that the miner is differently situated from any other class of men. His operations are far removed from public knowledge and investigation. When the peculiar perils and privations of the mine are better understood by the general public the miner will be honored where he is now despised. My experience the last year in visiting the mines throughout the State, more than ever convinces me that the discontent among miners comes not so much from the evil nature of the men, as the evil condition of the mines. Therefore, laws should be enacted giving the miner protection of life and health. In the following recommendations I have endeavored to suggest only what is just and right between the operator and miner. If the recommendations should become part of the mining laws of our State, they would undoubtedly be a great benefit to the underground workman, without oppressing the operator, and nothing more than some of the operators in the State have done before they considered their mines secure, and nothing but what all should be compelled to comply with, in order to secure to the miner greater chance for his life in case of accident from his daily avocation in the mine.

RECOMMENDATIONS.

The requirements of the mining law in regard to the Inspector enumerating all accidents in and about the mines (section 3) demands an impossibility of the Inspector, for this reason: The law does not require the operators of mines to report any but fatal accidents, so that those are all the Inspector can enumerate in his report, as the serious accidents are not reported to him, and he has no way of finding out about them, unless they happen while he is at the mines. The law should require the operators to report all accidents, or the Inspector should not be required to enumerate them.

Fifteen hundred dollars, the present salary of the Inspector (section 4), is too small, as the law does not make any provision for traveling expenses. Section two of the law says: "The Inspector shall give his whole time and attention to the duties of his office, and shall examine all the mines in this State as often as his duties will permit," etc. Now, in order to do this, the Inspector is compelled to travel most of his time, as there are twenty-six coal-producing counties in the State. The expenses of travel are therefore large, and if it had not been for passes on the different railroads the mines could not have been visited as often as they were. When the magnitude of the work is taken into consideration, the salary should be $2,000 a year, and a Mine Inspector should not be compelled to rely on passes on the railroads in order to enable him to carry out a law of the State. Furthermore, the possession by the Inspector of passes on the different railroads, under existing circumstances, gives a chance for dissatisfaction on the part of some of the operators; for the reason that some of the railroads are largely interested in coal, and passes over such roads are a money consideration to the Inspector under the present law, to the apparent prejudice of the coal companies that are not interested in railroads. (See Penn. law, section 8.) When a mine is wrought out and abandoned, the maps or plan of that mine (Sec. 7) should be filed in the office of the Inspector. The provision of the law in regard to the second opening (Sec. 8) will apply to slope or drift openings where the openings are never covered with buildings, and the only danger arises from caving or falling in of the openings; but where a mine is opened by a shaft, fifty feet therefrom is too close for an escape-shaft, because in case of fire at the hoisting-shaft, if the wind should be in the direction of the escape-shaft, situated fifty feet from the hoisting-shaft, the heat from the burning building would not admit of anyone coming up the escape-shaft. In regard to the time given by law for the second opening to be made, I should recommend that it should not be lawful for the operator of any mine opened by a shaft, after the expiration of the time given by law within which to make the second opening, to employ any person in said mine until the said second opening is made, and that the second opening at all mines opened by a shaft, should not be less than one hundred feet from the hoisting-shaft. (See sections 2 and 3, Pennsylvania Mining Law, and section 297 of Ohio Law.)

Of the mining law, I have had considerable trouble with section 10, for the reason that the law does not state the amount of air per minute that should be furnished each person employed in the mine. There is an impression that because there is no fire-damp in any of the mines in this State, a current of air, however small, is sufficient to ventilate a mine. Another trouble is that some of the mines are worked extensively some portions of the year, and therefore require quite a strong current of air in order to free the mine from impurities, and when the force becomes reduced, the volume of air is reduced in proportion to the number of men drawn out, not realizing that most of the trouble we have to contend with originates from the decomposition of the different substances in the mine; and the mines in this State are more subject to spontaneous combustion than the mines of any other State. They therefore require a large amount of fresh air. Sometimes when there are only a few men employed I have noticed, in testing and measuring the current of air in the different mines, that in room-and-pillar work, where a mine had a volume of air of less than one hundred cubic feet per minute for each person employed in the mine, the ventilation was always deficient; in some mines, where the volume of air was equal to one hundred cubic feet per minute for each person employed, the ventilation was poor, but would be made good by having the doors and brattices made tight, so as to avoid the leakage of air. I would, therefore, recommend that the operator of every coal mine shall provide and maintain for every such mine an amount of ventilation of not less than one hundred cubic feet per minute for each person employed in such mine; and that all mines governed by the provisions of this act shall be provided with artificial means of producing ventilation, such as fans, exhaust steam, furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air for all the requirements of the mine. (See Ohio Law, Sec. 298.)

I desire to call attention to the provision of the law with respect to the ages of boys before they are allowed to work in the mines. Section 13 says: "No boy under twelve years of age shall be allowed to work in any mine, and it shall be the duty of the agent of such mine to see that the provision of this section is not violated"; but there is no penalty attached for refusal or neglect to do so. Boys under twelve years of age are working in the mines at the present time. Fathers of boys should be required to furnish an affidavit as to the age of their boys when there is any doubt, and there should be some penalty attached for refusing or neglecting to do so. I would recommend that the law prohibit any person under fifteen years of age from working in any mine unless he can read and write, and that the mining boss be required to examine and test a boy's requirements in that respect before employing him, and that fines and penalties be provided for neglect or refusal to do so. (See Ohio Mining Law, section 302.)

LIST OF FATAL ACCIDENTS

IN THE MINES OF THE STATE, FROM JULY 4, 1880, UNTIL JULY 1, 1881.

July 22, 1880, William Jukes was killed by a fall of slate in the mine of the Whitebreast Coal Company.

October 22, Thomas Scott was killed by a fall of slate in the Happy Hollow Mine, operated by Fix & Postlewait.

December 14, Milton E. Conady was killed by a fall of slate in Hutchison Brothers' Mine.

February 28, 1881, J. W. Lawson was killed by a fall of false roof in the Iowa Coal Company's Mine.

February 21, 1881, James Blackburn was killed by falling down the shaft he was operating. The mine had no gates on the landings, and the cage caught in the shaft and the horse walked some distance allowing considerable slack rope to collect between the shaft and drum of the gin. When he caught hold of the rope and gave it a jerk, the cage came loose, dropped, and jerked him headforemost into the shaft.

May 30, John R. Griffiths was killed by a fall of rock in the Whitebreast Coal Company's mine.

Total number of fatal accidents in the year, six.

The accidents above reported resulting from falls of roof in the working places of the miners exceed in number those which result from all other causes combined. Accidents caused by falls of roof and coal are mainly under the control of the miners themselves, and the number of fatal accidents can only be lessened by increased care on their part, as in almost every case the coal companies are exonerated by the coroner's jury from all blame connected with the loss of life by falls of slate in the working places of the miners.

The mining law contains a provision (Section 15) subjecting to fine and imprisonment any miner who refuses to obey any order given by the mine superintendent in relation to the security of the part of the mine under said miner's immediate control; but accidents resulting from refusal to comply with this provision of the law are little under the control of the mining-boss, who cannot be more than a few minutes each day in the working-place of any miner. The responsibility, therefore, rests to a great extent with the working miner.

MINE VENTILATION.

The subject of mine ventilation has never received any special attention in this State, as the mines do not produce any explosive gas. The general impression is that anything that will cause a current of air, however small it may be, is sufficient to ventilate a mine. It will be seen from the description of the mines that there are four kinds of ventilation used in the State; viz., fan, furnace, steam and natural. Natural ventilation is the simplest mode, and one which is suggested by the ordinary currents of air. In natural ventilation, the air passes into the mine at the lowest level and returns to the atmosphere at a higher level, where the air is more rarefied and where the atmospheric pressure is the least. This system of ventilation cannot, however, give good satisfaction in this State, for the reason that our coal seems to lie in almost a horizontal position, and we very seldom find any material difference in the height of the different openings in the same seam of coal, while the temperature is nearly the same, and the pressure of the atmosphere is exerted on both openings almost equally; consequently some force should be employed to create a movement and propel a current of air through the mine in a given direction. The question is often asked by those who are relying on natural ventilation: "Why it is that the natural heat in the mines will not always produce a current of air?" The answer is that it must be remembered that the temperature of the mine and of the underground workings is sometimes several degrees higher than that of the air at the surface; and when this is the case, other circumstances being favorable, there will be a natural draught in the mine. In winter, when it is extremely cold, there will be a large current, as sometimes there will be a difference of several degrees between the two temperatures. That in the mine being warmer, there would be a natural current, as heat expands the air so that a cubic foot of warm air is not as heavy as one of cold air, hence the warm air rushes up the upcast, and the cold air passing into the mine, it is raised in the temperature and thus a natural current is produced. But where two shafts or openings are made into a mine of the same depth, and the top and the bottom of both are in the same level, as is often the case in this State, there can be no movement of air in the mine, even if the air in the mine and that of the surface is of different density, because the pressure of the atmosphere on both openings is equal. If one of the openings is made in higher ground, then that opening has a less atmospheric pressure on top, and there would be a natural current, provided, however, that the temperature of the mine and that of the surface are of different densities. When the atmosphere above ground and that of the mine approach each other in density, there is no motion of air in the mine except what is produced by the movement of the cars along the roadways of the mine. Therefore, the conclusion must be that there is little or no natural current of air in a mine in warm weather; that natural ventilation is generally very small in amount and should never be depended upon, no matter how small the requirements of the mine may be; and that some force should be brought to bear to create a movement of air in the mine.

This force is generally furnished throughout this State, by a furnace. This, in most mines, is situated at the bottom of the upcast; the heat from the furnace, rarefying the air in the upcast shaft, creates a rapid upward movement of the mine vapor; and the cold air from the surface, rushing in to take its place, causes a current of air, if properly conducted, to travel through all the avenues of the mine.

The steam jet acts on the same principle. When the steam is let loose in the upcast, it suddenly springs upward and moves the air quickly in its vicinity; but its force is soon exhausted. So that it does not exert its propelling power any distance up the shaft, and if the shaft is deep the steam cools and not only loses its force, but, condensing, falls back and retards the column. In deep shafts the steam pipe should extend a sufficient distance up the shaft so that the steam would reach the surface before condensation commences.

Next we have the fan ventilation. There are two kinds of fans used for ventilation in this State. One is the blow or force fan; the other the suction fan. The suction fan, by its revolving force partially counteracting the pressure of the atmosphere by reducing the weight of the air on the top of the upcast, allows the air in the upcast to swell and expand, whereby its weight is diminished, and the atmospheric pressure, remaining the same on the top of the downcast, overbalances the column of air in the upcast, thereby causing a current of air to travel through the mine.

The question is often asked which is the best mode of fan ventilation. If those who contemplate using fans will study the science of ventilation they will find that air is an elastic fluid, which increases in tension by the pressure exerted; that air, occupying a certain space under the ordinary atmospheric pressure, can be reduced to half the space by double the pressure, and to one-third the space under a treble pressure, and so on; and that, consequently, the density of a given column of air varies directly as the pressure on each unit of surface under which it exists, the temperature remaining unchanged. The effect, therefore, of forcing air into a mine through a long series of intricate passages is to increase its density in proportion to the pressure applied and the length of the column. The object of the ventilation should be to remove the cause that distresses the underground workmen, and that cause should be removed as soon as possible. To do this I consider the suction fan the best, or the fan placed at the top of the upcast, especially in mines which produce the amount of carbonic acid gas that the mines of this State produce. The ventilating fan employed at the upcast, by reducing the weight of the air in the upcast, allows the air to expand, whereby its weight is also diminished in the space occupied. The air being elastic, a reduction in weight allows the air to swell and expand on the same principle as it is swelled out by heat; and, the pressure of the atmosphere at the top of the downcast furnishing the supply of fresh air, the propelling power is increased every yard along the whole length of the underground passages of the mine from upcast to downcast the same as a furnace. But suppose the ventilating fan be placed at the top of the downcast. By its revolving force it must exert a pressure on the air in the downcast, whereby its density is increased so that the greatest moving propelling weight or density is at the downcast, as before, in order to overcome the pressure of the atmosphere on the upcast. But by increasing the density the velocity of the moving column of air is necessarily decreased and caused to travel slower, and as the work in the current's motion is in proportion to the increased or diminished velocity, and as carbonic acid gas is the heaviest of all the gases, and the principal gas with which we have to contend, occupying the lowest strata in all of the mines, like sand in the bottom of a river, the same law for removing one holds good for the other; and that is this, that the greatest velocity in the moving current of water is necessary to remove sand in the bottom of a stream; so, also, the greatest velocity in the moving current of air is necessary to remove carbonic acid gas from the workings of our coal mines, or, in other words, whenever you increase the density of a column of air above that produced by the ordinary atmospheric pressure you decrease the velocity, and in the same proportion as you decrease the velocity you decrease the ventilating power, as applied to the mines of this State. The ventilating fan should therefore be applied where it would give the greatest velocity to the current of air, removing the noxous gases as soon as possible, and conducting them with the greatest possible speed out of the mine, and giving nature's laws a chance, by the pressure of the atmosphere on the top of the downcast shaft, to supply fresh air to the men employed. The atmosphere is a vast ærial ocean, of which the earth is the bottom. It is estimated that this ocean extends upward to a height of about forty-five miles, growing gradually lighter in the ascending column. In sustaining the column from the top downwards the bottom is squeezed and contracted into a smaller bulk, and consequently greater density. At the height of three and a half miles, air is twice as light and elastic as at the level of the sea, and at seven miles of height it has been considered to be four times as light, and so on until it gradually thins out to nothing. A column of air, the whole height of the atmosphere, weighs about one ton to the foot square, and a column one inch square weighs about fifteen pounds. An ordinary sized man sustains the immense weight of about fourteen tons. The atmospheric pressure on a shaft sixteen feet square, in this latitude, would be something over twenty-seven tons; and on top of a circular shaft, nine feet in diameter, the atmospheric pressure is something over eighty-one tons. I, therefore, fail to see the philosophy of placing a ventilating fan at the top of the downcast to increase the pressure or weight of the atmosphere in the shaft in order to ventilate a mine. The atmosphere consists chiefly of oxygen and nitrogen gases in the proportion of about twenty-one volumes of oxygen, to seventy-nine of nitrogen. It, also, contains a minute but essential quantity of carbonic acid gas, which, however, varies at different times. Besides, there are found in it variable quantities of the vapor of water, and traces of ammonia, sulphureted hydrogen, and carbureted hydrogen. Of the constituents of the air the oxygen and nitrogen are usually spoken of as fixed, the carbonic acid, ammonia, and water as variable. There are causes in constant operation that tend continually to impress changes in the amount of all these bodies. Every process of combustion, and the respiration of every animal, removes oxygen and replaces it by carbonic acid; but the growth of plants has the reverse action, removing carbonic acid and replacing it with oxygen; that for many centuries in succession the constitution of the atmosphere is unchanged. The earth's atmosphere, in its relation to the world's organization, is full of interest. All plants come from it, and all animals return to it; so that it stands as a bond of connection between these orders of life; hence, in the mines, the workmen are removed from all vegetation, so that there is nothing to consume the carbonic acid gas as it accumulates from the several causes constantly operating in mines. It, therefore, becomes necessary to bring some force to bear to remove the gases from the mines as soon as they accumulate, in order that men can work therein without injury to themselves. At a great many mines in the State the true object of ventilation is lost sight of. No attention is paid to the upcasts, it being apparently thought that a large intake is all that is necessary, and if there is a fan to ventilate the mines anything will do, so that it is a fan; and if a furnace is used, anything will do that will hold fire. But there are other things necessary besides good fans or furnaces to properly ventilate a mine. It is, also, necessary to have large and roomy air-ways, uniform in size; and they should never be contracted at any point to a less general diameter than the volume of air requires moving at a uniform speed. After an air-course has been driven, it is just as necessary to keep it free from falls and all foreign matter as it was to drive it large in the first place; because air, moving in a compact body, drags on all rough and uneven surfaces, and the smoother the passage the less the friction the current of air meets with while passing through the mine.

Many of the furnaces in the State are too small for good results;

the air is too confined in passing through. Roomy air-ways are of little avail with a small furnace. So are roomy air-ways with a small upcast. There are instances of this kind in the State where the intake is large and roomy, and the air-ways are of good size, and yet the upcast in some cases is not over one-tenth the size of the air-ways. At other mines, where there is a large intake and a large upcast, the furnace has, perhaps, not more than three or four cubic feet capacity, some in the State falling as low as three cubic feet or less. It makes no particular difference where the air-shaft may be located, so that it has depth and the air-courses have width. A good furnace or fan will then give motion to the necessary quantity of air. Good furnaces are something seldom met with in the mines of this State. It is a matter of great importance that care should be taken in building a ventilating furnace, for several reasons. Setting the coal on fire must be guarded against, and the furnace should be situated far enough from the upcast shaft to obviate danger of setting the woodwork on fire. For this reason some place the furnace on top. This should never be done. The proper place for a furnace is at the bottom of the upcast, because the power of a furnace depends upon the amount of heat produced, and the longer column of heated air there is in a shaft, the greater the velocity of the ventilating current. This fact should be thoroughly understood among mine foremen, as many a shallow mine is poorly ventilated because, in addition to the imperfection of a shallow shaft, there is added that of a small furnace. A furnace should be built with a view of making as hot as possible the column of air while passing over it, and in order to do this the furnace should be built so as to allow as much grate-bar surface as can be had. The fire should be scattered over the entire surface of the grate-bars. In that way more heat is exposed to the column of air while passing over the fire. Another mistake is made by some in the manner in which they make the fire in the furnace. Their object is to build a fire that will last as nearly all day as possible, consequently they use the largest coal they can get, which not only makes a dull fire, but blocks up the passage of the air at the furnace. Fine coal is better for building a fire at the furnace, as it will cause a flame which is better for ventilating purposes than a smoldering fire. Some make a mistake in building their furnaces by blasting up the bottom to get room, thereby causing the air to have to dip, in order to pass through the furnace. It should, on the contrary, be made to slant upward if possible in going to the furnace. The air must be carried to the working places where the miners are at work. To do this it is not only necessary to have roomy air-ways and good furnaces or fans, but doors and stoppings should be promptly provided. If not, the air will take the nearest route from the intake to the upcast, and be of no benefit whatever to the miner. Most of the underground bosses admit that twenty yards is far enough for men to work ahead of air, and they say that they always have the entry drivers make a cross-cut every sixty feet, but they will have men turn rooms off an entry and drive them seventy-five and sometimes one hundred yards without any current of air nearer than the entry. When requested to hang doors on the entries they think it is all foolishness, but the miner who is working at the face of his room, perhaps seventy yards from the entry, where his lamp burns with a black and cold flame caused by the accumulation of gas, would hail a current of fresh air at his working place with delight.

It is not only necessary to have a strong current of air passing through the workings of a mine, but it is necessary to divide or split the current of air so that all the different portions of the mine can receive fresh air from the intake, and as soon as one division of air has passed through all the workings of that division conduct it direct to the upcast. There are two benefits to be derived from dividing or splitting the current of air: The first is, you give the men fresh air; and the other you increase the volume of air by diminishing the friction. For instance, if we have thirty thousand cubic feet of air traveling per minute through an air-way in the mine of thirty cubic feet capacity, there would be more friction in the current than if the same current of air was split and conducted through three different air-ways of the same capacity; and for every additional split or divide of the air an additional quantity of air on the whole is obtained; but, owing to the size of the shafts, it is not best to have too many divides, for in each divide the quantity becomes less and less, and if too many are made the current becomes too slow and feeble to sweep the impurities from the mine, as it requires a strong current of air to remove carbonic acid gas from the working places of the miner; and a great many of the mines in this State use so much powder it is necessary to have a strong current of air passing through all of the working places. It is not only necessary to have a strong current of air traveling along the air-ways, but there should be doors placed on the entries in order to force the current of air to sweep the face of the working places; although some contend it is not necessary, and claim that a strong current of air passing on an entry forms a suction which causes the powder smoke and other impurities to leave the face of the rooms and travel on to the air-ways. If those who thus argue give the proper attention, they will find the effect quite the opposite. In almost every instance the rooms are turned narrow off the entry and the current of air passing on the entry has a tendency to back the powder smoke into the rooms instead of drawing it out. There should be doors placed on all of the entries, no matter how large a current of air is passing, and if shut at no other time than during the noon hour and night, it would be a great benefit to the miner by having the face of the rooms clear of smoke when they return to work after the noon hour. The most of the mines in the State are better adapted for fan ventilation than furnace on account of the moderate depth of the coal from the furnace. The deeper the shaft the better the draft and the longer the column of heated air from a furnace, and the shallower the shaft the better the ventilation from a fan, although some of the furnaces give better currents of air than some of the fans. But if those same fans had larger airways and a larger upcast they would give better satisfaction. A furnace is more liable to be neglected than a fan which can be kept in motion by the hoisting engineer without interfering in any way with his other duties, but the furnace is different. Of all the mines I have visited where a furnace is used, I have found only one where it was made the business of any one man to keep up a fire in the furnace so that if the fire was neglected he alone was responsible.

The fault of poorly ventilated mines is not altogether the furnace. In some of the mines the pit-boss is in a hurry to do something else, and he thinks the roadman will build the fire, and the roadman has some track to fix and he thinks the boss mule-driver will fix the fire, and the boss mule-driver is busy and he thinks somebody else will build the fire, and somebody else supposes that the fire has been built, and so on; consequently the fire is not built, and if a miner complains about the air he is given to understand that if he doesn't like the air in that mine he can go where he can get better air, and in a day or two you see a coal miner hunting a job of work. Some may think this a little overdrawn, but it is not; circumstances of this kind happen very often.

GASES.

Carbonic acid gas, or black-damp of coal mines, is composed of carbon and oxygen. Its specific gravity is to that of common air as 1.524 to 1, or a little more than one-half heavier. This gas is always found occupying the floor of the mine, as it is heavier not only than common air but also than any of the other gases. It is often found in the mine for two or three feet in thickness, while the air above is comparatively pure, although it will diffuse with common air. Being thus heavier than any other gas, force is required to remove it. This gas is accumulated from several causes: The respiration of men and animals, the combustion of the workmen's lights, the decomposition of timber and small coal in the gobs, the explosion of powder used for blasting down the coal and for whatever purpose it may be used in the mine, and from the excrementitious deposits of men and animals; and it also exudes from the roof and floor of the mine. Carbonic acid gas in its pure state is a deadly poison, as it will support neither life nor light. This is proven by the fatal accidents that have happened to persons going into wells and old prospect holes, and down the shafts of abandoned mines. This gas, when mixed with a certain portion of pure air, can be breathed for some time where the miner's lamp cannot be kept burning; but its effect on the miner is such as to produce headache, languor, weakness in the legs, loss of appetite, and general depression; and to this may be attributed the fact that so many miners are addicted to drinking. On coming out of a mine when the air is heavily loaded with black-damp, the miner often feels so depressed that the first thing he does is to go to a saloon for something to revive his spirits, stimulate him and give him an appetite; and when once there he often remains, without washing or supper, until late in the night. In mines where the workmen use a great number of powder an increased amount of carbonic acid gas is accumulated over mines where no powder is used. Gunpowder contains 78.8 per cent of niter, 13.3 per cent of sulphur, and 11.9 per cent of charcoal; or, in equivalent parts, 101 of niter, sixteen of sulphur, and eighteen of carbon; when exploded, it is converted into sixty-six parts of carbonic acid gas, fourteen of niter, and fifty-five of the sulphide of potassium. Blasting powder consists of nearly equal molecules of nitrate of potassa and sulphur, with six molecules of charcoal; accordingly 100 parts contain of saltpeter 66.03, sulphur 10.45, and charcoal 23.52. One hundred parts by volume of the gaseous product of the combustion consists of carbonic acid gas 52.67, nitrogen 41.12, oxide of carbon 3.88, hydrogen 1.21, sulphureted hydrogen 0.60, oxygen 0.52. Consequently, after the miner fires his blast, he can neither work nor live in the smoke, and to use his language, he waits until the smoke from the blast cools, when in reality he is waiting for the gases to be diffused through the air. The time for this varies according to the ventilation. Where a strong and rapid current of air is made to sweep the working places the smoke is soon carried away; but where the current of air is weak the smoke hangs longer, and is often found in the working places all day in blinding and suffocating volumes, sometimes forming into layers of thick and thin smoke resembling solid substances, and frequently the miner stops suddenly on entering it thinking he is coming into contact with a loaded car or pillar of coal.

The health of a man working in the mine under the condition above described, is slowly but surely undermined, and not only that, but his temper is very liable to be considerably soured. Carbonic oxide gas, or white-damp, is also heavier than common air. It contains 56.69 per cent of oxygen and 43.31 per cent of carbon. This gas affects the miner more than carbonic acid gas and is different in its nature. Black-damp will not support light, while white-damp will admit of the miner's lamp burning with increased brilliancy. It is considered by some that a very small amount of this gas is found in mines. This may be the case from natural causes, but when we consider that white-damp is produced by the explosion of blasting-powder and from fires in the mines, we realize that this gas is, to a considerable extent, the product of the ordinary combustion of what is termed in this State "gob-fires." It can be recognized by its flickering blue flame seen playing over the glowing embers.

Sulphureted hydrogen gas is a transparent colorless gas of a disgusting odor. It is highly poisonous when respired, and even when diluted with 600 times its bulk of air, is rapidly fatal to the lower animals. Its density a little exceeds that of atmospheric air, 100 cubic inches weighing a little more than thirty-eight grains. In sulphureted hydrogen, one volume of sulphur vapor and two volumes of hydrogen are condensed into the space of two volumes, and the composition of the gas may be represented as: sulphur, 94.12; hydrogen, 5.88. This gas is also sometimes found in coal mines. It is generated in the wastes from the decomposition of iron pyrites.

Light carbureted hydrogen gas, commonly called fire-damp, is one of the principal constituents of coal gas. It occurs in many coal mines. It is seen bursting forth from the seams of coal, and blowing out from the fissures as though escaping from under high pressure. When mixed with five times its volume of air an explosive mixture is found, which takes fire on approach of a light. When the mixture has been brought to about nine volumes of air to one of fire-damp the most dangerous mixture has been attained. The fatal results ot an explosion of fire-damp in the mine are not, however, limited to the mechanical violence which it occasions to the sufferers. The vitiated atmosphere the explosion produces is often fatal to those employed in other parts of the mine, or to the generous but ignorant and rash survivor who attempts to descend into the pit before it has been properly ventilated in order to rescue his comrades or to ascertain their fate. From the composition of fire-damp it is obvious that this gas in exploding renders ten times its bulk of atmospheric air unfit for respiration, the two volumes of oxygen which ten volumes of air contain, producing one volume of carbonic acid and two of steam, which becoming condensed is also converted into the same gas, leaving eight volumes of nitrogen at liberty. The mines of this State are not troubled any with fire-damp, and for that reason in the majority of the mines very little attention was paid to ventilation. If the air was too poor to permit the men to work, they were allowed to go home until a change in the atmosphere renewed the ventilation.

I will now take the liberty to quote the following, being from the pen of one of the best authorities on mining:

THE GASES OF COAL MINES.

BY JOHN J. ATKINSON.

A variety of gases is given off by the coal and other minerals met with in coal mines. A further supply of gases arises from the breathing of men and animals, and from the burning of candles and lamps, as well as from the explosion of the powder used for blasting the coal and stone in the mines. The whole of these gases are capable of causing the death of men and animals, breathing them in their pure and undiluted state, and some of them require to be mixed with many times their own volume of air before the mixture they form with it can be breathed for any great length of time with safety.

Some of the gases given off in coal mines, when mixed with certain proportions of air, form violently explosive mixtures. Such a mixture of air and gas on being ignited by a naked candle or other flame, suddenly explodes and becomes one mass of living flame, scorching and burning everything that may happen to be in contact with it. Such an explosion, in general, also creates a complete hurricane or tornado of immense force and violence, tearing and driving all before it, knocking down the masonry erected for the guidance of the ventilation as well as the props and timbers erected to support the roof of the mine, which falls in great masses, causing bodily injury or death to those it may fall upon, and often inclosing and imprisoning those who, being unhurt by its fall, are left stunned by the concussion, more or less scorched by the flames, and, without lights, shut up to breathe the deleterious atmosphere produced by the explosion. The flames of such an explosion being extinguished, and its violence exhausted, there remains an atmosphere so hot and so charged with noxious gases and steam, as to cause the death of all who are left alive to inhale or breathe it. This resulting atmosphere is generally termed *after-damp.* The grand object of the ventilation of mines is to cause such a current of air constantly to circulate through them as shall, by mixing with and diluting the gases, render them harmless, and, in that state, carry them off as quickly as they are produced in the mines. It is here proposed, in the first instance, to remark upon the chemical composition of the air we breathe; then upon that of a few of the important gases met with in coal mines; and afterwards to notice some of the leading principles of ventilation, by taking advantage of which we get rid of the gases as fast as they are given off in mines.

ATMOSPHERIC AIR.

Air is, almost entirely, a mixture of two gases--oxygen and nitrogen; carbonic acid is also present in limited but variable proportions, forming, on an average, about one part to 2,500 parts of our atmosphere. Besides oxygen, nitrogen and a trace of carbonic acid gas in the atmosphere, there is always more or less of watery vapor, diffused through the gases of which it is composed; but this vapor is variable in amount, is not considered as forming a constituent part of the atmosphere, and is, therefore, not embraced in statements as to the chemical composition of air; yet its effects are of the highest importance, both in the general economy of nature, and also in considerations relative to the ventilation of mines. Dry air is chemically composed of

	BY WEIGHT.	BY VOLUME.
Nitrogen gas	77 per cent	79
Oxygen gas	23 " "	21
	100	100

A cubic foot of air at the temperature of melting ice (32°), and under pressure of 14.7 pounds per square inch, or 2,116.8 pounds per square foot, weighs 0.080728 pounds; that under the same conditions 1,000 cubic feet weigh 80,728 pounds avoirdupois.

NITROGEN GAS.

Nitrogen gas is rather lighter than air taken in equal volumes at the same temperature and under the same pressure. The specific gravity of air being taken as 1,000, that of nitrogen gas is only 971.-37, so that the weight of 1,000 cubic feet of air being 80,728 pounds, that of 1,000 cubic feet of nitrogen is only 78,416 pounds, at the temperature (32°) of melting ice and under the pressure of the atmosphere, taken at 14.7 pounds per square inch, or 2,116.8 pounds per square foot. A cubic foot of nitrogen, under the same conditions of temperature and pressure, weighs 0.0784167 pounds and a cubic foot of air 0.080728 pounds as heretofore stated.

Nitrogen gas has neither color, taste, nor smell, and so far it is like air itself. It will not support life, but causes death when breathed. It will not support combustion, but extinguishes lights. This gas has very little chemical affinity or attraction for other bodies; its chemical properties are rather those of indifference than of activity; its position amongst gases, in general, being almost like that of water amongst liquids as it serves to render their properties less active. It dilutes the oxygen of the atmosphere, which could not long be breathed without being diluted with nitrogen. Nitrogen is, however, probably the best part of manures for lands; and it is a component part of nitrous oxide or laughing gas, of ammonia, and of nitric acid, or aquafortis, as well as of many other compounds.

OXYGEN GAS.

Oxygen gas, as has been stated, forms about twenty-one parts by volume, or twenty-three parts by weight, out of every 100 parts of air, being rather more than one-fifth part. The specific gravity of air being taken as 1,000, that of oxygen gas is 1,105.63; 1,000 cubic feet of air, at 32°, and under a pressure of 14.7 pounds per square inch weigh 80,728 pounds; 1,800 cubic feet of oxygen gas, under the same conditions, weigh 89,255 pounds; so that this gas is rather heavier than an equal volume of air. Oxygen gas has neither color, taste, nor smell. This gas, in a free and uncombined state, is essential to life, we must breathe it in this state or die; in its undiluted state it is not fit to breathe beyond a very short time. In our atmosphere it is fitted to sustain life by dilution or mixture with nitrogen gas. Chemical compounds in the gaseous form may contain large proportions of oxygen and yet be unfit for respiration or breathing; to be suited for this purpose, the oxygen must be free and uncombined, and at the same time diluted.

Oxygen is the most abundant substance in nature, and constitutes at least one-third of the solid mass of the earth—twenty-three per cent of the air, and eighty-nine per cent of water. Oxygen has strong affinities and combines with all known substances, except *fluorine*. It forms, with other substances, no less than 136 inorganic compounds, and it would be difficult to say how many organic ones. This gas is the great supporter of combustion. Substances that burn in air burn much more vividly in pure oxygen, showing that the oxygen in the air is the supporter of combustion. Iron wire will burn in oxygen, but not in air; and this is also the case with other metals in a finely divided state. When, by breathing we inhale air into our lungs a part of oxygen it contains combines with carbon, and we exhale or breathe out, as the result, an equal quantity, by volume, of carbonic acid gas, and consequently liberate about $3\frac{16}{21}$ times as great a volume of free nitrogen gas. Having glanced at the chemical constitution of the atmosphere, let us next consider that of the principal gases met with in coal mining.

CARBONIC ACID GAS.

When this gas is met with in coal mines it is often called *stythe, choke-damp or black-damp.* It is composed of oxygen and carbon. We have already considered the nature of oxygen as a component part of the atmosphere, but we must not expect to find it show the same properties when chemically combined either with carbon or any other substance whatever. Carbon, the other part ot the choke-damp, forms the chief ingredient in coal; and coke contains a still larger proportion of this substance; but the diamond is pure carbon, in a crystaline state. The chemical composition of carbonic acid gas is:

	BY ATOMS.	BY WEIGHT.	BY VOLUME.
Oxygen................	2	72.73 per cent	1
Carbon................	1	27.27 "	1
	1	100.00	1 condensed

Now, although this gas contains nearly three parts out of four, by weight, of oxygen (the life-supporting element), yet because it is combined with another substance (carbon) the result is in this case a poisonous gas. It is dangerous to life to breathe air containing eight per cent, or one-twelfth, of this gas. Lights are extinguished in air containing ten per cent or one-tenth of it. At thirty-two degrees, under a pressure of 14.7 pounds per square inch, 1,000 cubic feet of air weigh 80,728 pounds and one thousand cubic feet of carbonic acid gas weigh 123,353 pounds. So that it is rather more than one and one-half times as heavy as an equal volume of air. The specific gravity of air being 1,000, and that of carbonic acid gas is 1,528.01. Before being mixed with air it rests next to the "thill" or floor of mines, owing to its great heaviness or density when compared with air. This gas besides being given off naturally into many mines, is always found to result from the breathing of men and animals, and the burning of candles and lamps, and mixed with other gases from the explosion of the powder used in blasting. Near the mouth of an adit, or drift, at Butterknowle Colliery, in the county of Durham, the writer has seen several small birds lying dead from the effects of this gas. They had come to feed upon the crumbs where the workmen ate their meals, and close to the mouth of this was an abandoned drift, and the gas coming out of the drift at the level of the ground had overcome them. At the same colliery, in several places where the coal has been worked away, the ground has been rent up to the surface, and it is said that birds flying across these rents or pitfalls, in some instances, are so quickly affected by the escaping gas as to drop into the holes and die there. Without disputing the fact of dead birds being found in the holes, the reason assigned as the cause of their coming there appears to be rather doubtful. The effect of the gas is not, perhaps, so instantaneous as to account for it. Unfortunately, birds are not the only sufferers from this gas, for many human beings have met their deaths through breathing it; and in many other cases injurious effects are produced on the health of workmen through the mixture of this gas, in small proportions, with the air of mines. Limestone consists of carbonic acid and lime, and chalk is of a similar composition; these ingredients, however, being generally mixed with oxide of iron, magnesia, and other substances in less but variable proportions.

PHOTO-CARBURETED HYDROGEN GAS.

Light carbureted hydrogen gas, or, as it is sometimes called, marsh gas.

This gas is the fire-damp of the mines. It contains one atom of carbon, combined with two atoms of hydrogen, or some multiple of these. Taking the atomic volumes of carbon and hydrogen to be the same, it contains one volume of carbon, combined with two volumes of hydrogen—in all three volumes—but the three volumes are condensed into one volume of fire-damp. The weight of air, at the temperature of melting ice (32°), and 14.7 pounds per square inch pressure, is, for 1,000 cubic feet, 80.728 pounds; that of 1,000 cubic feet of gas under the same conditions, is 45,368 pounds; so that the specific gravity of this gas is 562, that of air being 1,000, it being rather more than half as heavy as an equal volume of air under the same conditions. Owing to the fire-damp of mines being lighter than air, it lodges next to the top or roof in mines until, by diffusion, it gets quite mixed with air. This gas would soon cause death if breathed in a pure and undiluted state; but, when mixed with twice its own volume of air, it may be breathed for some time without serious effects. It quickly extinguishes lamps or candles when unmixed with air. Fire-damp or light carbureted hydrogen.contains nearly 25 per cent by weight of hydrogen. Hydrogen is the lightest known gas, being only one-fourteenth part of the weight of air. The hydrogen in fire-damp is, however, condensed into a smaller volume than it occupies in a free state. Light carbureted hydrogen gas is chemically composed of

	BY ATOMS.	BY WEIGHT.	BY VOLUME.
Hydrogen	2	24.6 per cent	2
Carbon	1	75.4 " "	1
	1	100.00	1 condensed

In the fire-damp of mines, however, we find a small proportion of other gases mixed with it. When one part of fire-damp is mixed with thirty parts of air, by volume, its pressure can be detected by the appearance of a flame of a candle; and as the quantity of fire-damp is gradually increased from one part to two parts in thirty of the air, the appearance of the flame is more and more affected by it; but even in the latter proportion the mixture will not explode. The flame of the candle is surmounted by a pale blue halo, called in mining language a "top" or "cap," which partakes more or less of a brown color according to the quality of *stythe*, or carbonic acid gas, that may be present along with the fire-damp. The examination of the flame, for the purpose of forming a judgment as to the quantity of fire-damp mixed with the air in mines, is, in mining dialect, called "trying the candle," or "trying the lamp." When the fire-damp forms as much as one part out of thirteen of the air, the mixture becomes explosive, so that, if ignited by an exposed flame, the whole of the mixture is converted into a mass of flame; in this state of the mixture, however, the force of the explosion is comparatively feeble. When there is only nine to ten times as much air as fire-damp, the explosive force is greatest. If the proportion of gas be greater than one part out of nine to ten of air, by volume, the force of the explosion gradually becomes less and less, until there is only five times as much air as gas when the mixture will no longer explode, but on the contrary, will extinguish the flame of candles or lamps that may be brought into it.

The presence of carbonic acid gas, or of free nitrogen gas in mixtures of fire-damp and air, is found to lessen their explosive force so that if we add to the most explosive mixture one-seventh part of its volume of carbonic acid gas it will not explode at all. Air containing one-fourth part of fire-damp, by volume, may be breathed for some time without very serious effects being produced on the animal frame. Common coal gas, as used for lighting, contains a large proportion of light carbureted hydrogen gas—the fire-damp of mines. Besides this, however, it contains a considerable proportion of pure hydrogen, some carbonic oxide, and olefiant gas. When a mixture of air and fire-damp is exploded, the chemical changes that take place, and the nature of the resulting mixture or after-damp are as follows:

MIXTURE BEFORE EXPLOSION.

BY ATOMS.		BY MEASURE.		
RELATIVE NO. OF ATOMS. VOLUME PER ATOM.		UNCOMBINED VOLUME.	COMBINED VOLUME.	VOLUME PER CENT.
AIR	Oxygen	4 x 1 — 4	18.8	90.385
	Nitrogen	7.4 x 2 — 14.8		
FIRE-DAMP	Carbon	1 x 2 — 2	2	9.615
	Hydrogen	2 x 2 — 4		
		24.8	20.8	100.000

MIXTURE AFTER EXPLOSION.

BY ATOMS.		BY MEASURE.		
RELATIVE NO. OF ATOMS. VOLUME PER ATOM.		UNCOMBINED VOLUME.	COMBINED VOLUME.	VOLUME PER CENT.
FREE NITROGEN		7.4 x 2 — 14.8	14.8	71.2
CARBONIC ACID GAS	Carbon	1 x 2 — 2	2	9.6
	Oxygen	2 x 1 — 2		
STEAM	Hydrogen	2 x 2 — 4	4	19.2
	Oxygen	2 x 1 — 2		
		24.8	20.8	100.00

Before explosion, there may happen to be present either an excess of air or of fire-damp, beyond what is necessary to cause the explosion; and if so they will remain mixed with the after-damp in an unchanged state after the explosion has taken place. There never can, however, be such an excess of air present as to render the after-damp fit to breathe, or the explosion could not take place; the limits are such that this is impossible. The above proportions of 1 of fire-damp to 9.4 of air form the most explosive mixture, a other proportions forming a less explosive mixture.

From the second table we perceive that the after-damp contains between seven and eight times as much free nitrogen as carbonic acid gas or choke-damp. It was at one time a popular mistake to suppose that the injurious part of the after-damp consisted only of carbonic acid gas or choke-damp—not among scientific chemists, but amongst respectable mining authorities—and that not very long ago. After-damp, it may be seen by the second table, contains about 71 parts of free nitrogen, 9½ parts of carbonic acid gas, and, at the moment of explosion, 19 parts of steam; so that it might be said, at this stage, that after-damp contains, in round numbers, seven parts of nitrogen, one part of carbonic acid gas, and two parts of steam, out of a total of ten parts. Directly after the explosion a large part of the steam condenses, and leaves, as a residuum, about 7½ of nitrogen, and 1 part of carbonic acid gas, out of 8½ parts; the whole unfit to breathe, and incapable of supporting either life or combustion. A small excess of air or of fire-damp might be left mixed with the after-damp of an explosion beyond what is noticed in the tables as being chemically changed; but in no case could the air of the after-damp contain less than twice its own volume of deleterious gases or the explosion could not have taken place; such a mixture breathed would soon cause death. Since explosions can not always be prevented, how important it is then to be prepared to mix and dilute the after-damp with fresh air in as speedy a manner as possible after this occurrence. If there is more fire-damp present than is chemically changed by an explosion the force of the explosion itself is lessened, but the after-damp resulting is more deadly than if an excess of air had been present at the time of the explosion.

CARBONIC OXIDE.

This gas is sometimes called white-damp, when met with in the mines. Assuming as before that the atomic volume of carbon is twice as great as that of oxygen, its composition is as follows:

	BY ATOMS.	BY WEIGHT.	BY VOLUME.
Oxygen	1	56.69	½
Carbon	1	43.31	1
	1	100.00	1 condensed

Its specific gravity is 875.195, that of air being assumed at 1,000; so that 1,000 cubic feet of air at 32°, and under a pressure of 14.7 per square inch, weighing 80,728 pounds, an equal volume of this gas under the same conditions will weigh 79,426 pounds, and one cubic foot under the same conditions will, therefore, have a weight of 79,426 pounds.

Carbonic oxide has a much more deleterious effect on the animal economy than carbonic acid; air which contains only one per cent of carbonic oxide almost immediately causes the death of warm blooded animals, as has been shown by the decisive experiments of M. Felix Leblanc. Carbonic oxide is itself an inflammable gas, but does not support the combustion of other bodies. It has no taste, but has a peculiar odor. Small animals immersed in it die instantly. When inhaled, it produces giddiness and fainting fits even when mixed with a fourth of its bulk of air. It is easily kindled, and burns with a blue flame, being transformed into carbonic acid by the process. The carbonic acid formed by combustion at the bottom of a coal, coke, or charcoal fire is sometimes converted into carbonic oxide, by being deprived of a part of its oxygen, as it passes upward through the red-hot embers; and on coming into contact with the air at the top of the fire, burns there with a blue flame, and is again converted into carbonic acid gas. This gas is perhaps never found in coal mines except as the result of the explosion of gunpowder or the combustion of coal or wood. Carbonic oxide is obtainable in a state of purity by heating yellow ferro-cyanide of potassium with eight or ten times its weight of oil of vitriol. Bunsen obtained it by slightly heating a mixture of formic and sulphuric acids; and, to insure the perfect purity of the gas, he passed it through a concentrated solution of caustic potash. Such a proportion of this gas might be mixed with air as to form a mixture in which candles or lamps would burn, while life would become extinct, and it is probable that many deaths in mines have resulted from this gas, in situations where the lights have continued to burn.

It appears to be very probable that the death of the men and boys in the late accident at Hartley Colliery arose in a great measure from this gas given off by the furnace, after the stoppage of the air current by the closing of the shaft; inasmuch as the lights used by the workmen engaged in clearing the shaft appeared to be rather increased in brilliancy than otherwise at the time when the most effects were felt from the escaping gas, and the mine gave off no fire-damp and very little choke-damp.

At page 120 in the minutes of evidence taken before a select committee of the House of Commons on accidents in mines, in 1835, the late George Stephenson, in reply to question 1,853, gives an account of an accident at Newbottle Colliery, by which several persons lost their lives by a gas in which the lights burnt well, and which the witness supposed to have been sulphureted hydrogen gas; but it appears to be more probable that it was a mixture of carbonic oxide, sulphurous acid, and a small quantity of carbonic acid gases generated by the explosion of gunpowder in the drift where it was found to prevail; because sulphureted hydrogen gas has a particularly offensive smell, of which no mention is made in the account of the accident.

The writer is acquainted with several instances where gases have caused deaths, and with others where they have caused severe indisposition, in places where candles continued to burn brightly; in some of these cases the gases were apparently produced by the explosion of gunpowder, and in others by the combustion of coals; and hence it appears to be probable that carbonic oxide was a prominent ingredient in them. In an experiment by M. Leblanc, a large-sized dog was asphyxiated in an atmosphere which contained 4 per cent of carbonic acid, and only $\frac{1}{2}$ per cent of carbonic oxide.

HYDRO-SULPHURIC ACID, OR SULPHURETED HYDROGEN.

This gas is sometimes met with in coal mines. It is colorless but distinguishable by its unpleasant smell, which resembles that of rotten eggs. It produces fainting fits and asphyxia, if inhaled, even when present only in very small proportions, with atmospheric air. When inhaled in its pure state it acts as a powerful narcotic poison. It does not support combustion but is itself inflammable, and burns when exposed to a supply of air and ignited; and when mixed with oxygen gas the mixture is explosive. It reddens tincture of litmus, but the reddening disappears on exposure to the air. The composition of sulphureted hydrogen is as follows:

	BY ATOMS.	BY WEIGHT.	BY VOLUME.
Sulphur.	1	94.15	$\frac{1}{6}$
Hydrogen	1	5.85	1
	1	100.00	1

According to Bunsen the specific gravity of this gas is 1,174.88, that of air being assumed at 1,000, under the same conditions as to temperature and pressure. Sulphur heated strongly, and repeatedly sublimed in fire-damp freed from oxygen by phosphorus, produced a considerable enlargement of its volume, sulphureted hydrogen was formed, and charcoal precipitated; the volume of sulphureted hydrogen produced (ascertained by absorbing it by solution of potassa) was exactly double that of the fire-damp decomposed.

Sulphureted hydrogen gas may be inflamed by charcoal or iron, even at a low red heat. In air it burns with a blue flame, forming water and sulphurous acid, and depositing sulphur. According to some authorities one fifteen-hundredth part of this gas in air is instantly fatal to small birds, one one-thousandth killed a middle-sized dog, and a horse died in an atmosphere that contained one two-hundred-and-fiftieth part of its volume. The presence of sulphureted hydrogen gas in the atmosphere, even in small proportions, can be detected by its action upon moist carbonate of lead, spread upon white paper, which it blackens. M. Parent Duchatelet observed that workmen breathed with impunity in an atmosphere containing 1 per cent of sulphureted hydrogen, and he states that he himself respired air containing as much as 3 per cent of the gas without experiencing any serious results. This gas is formed whenever sulphur in a very comminuted form is brought into contact with hydrogen in the act of being given off, and is probably formed to some extent where pyrites is undergoing decomposition in mines. When this gas is present with the air, in mines, candles will burn in the mixture so that if it is not detected by its odor it may prove fatal to life before its presence is detected.

It appears to be probable that this gas is frequently formed in old unventilated workings, partly filled with water. There are two instances mentioned by Mr. Nicholas Wood in his evidence before the committee of the House of Commons on accidents in mines in 1853—one at Hartley Colliery, which proved fatal to one person, and another at Tyne Main Colliery, where ill effects were felt, notwithstanding that lights burnt well, both of which, in all likelihood, were due to the generation of this gas from the action of the water upon pyrites in old workings.

A man breathes into his lungs about one-fifth of a cubic foot of air per minute, and converts about seven per cent (by volume) of this into carbonic acid gas, which, with about three and three-quarter times as much free nitrogen, he exhales, along with about sixty-six and two-thirds per cent of the air he breathes in an unchanged state. The largest lamp used in mining converts less oxygen into carbonic acid gas than a workman. Both give off water vapor as well as carbonic acid gas. When coal is on fire it gives off, in burning carbonic acid, carbonic oxide, and sulphurous acid gases. The explosion of gunpowder gives rise to carbonic acid, nitrogen, carbonic oxide, and steam, besides carbureted and sulphureted hydrogen in small proportions. In the ordinary course of mining these causes give rise to so small a quantity of gas in proportion to the air that they hardly belong to the subject in hand unless in reference to the state of a confined and unventilated part of a mine where a shot has been fired, or in the more rare case of coal being on fire in a mine.

Sir Humphrey Davy discovered that the flame of ignited gas would not pass through fine wire gauze, containing twenty-eight holes for each inch in length, or 784 holes per square inch, unless the gas is moved with great velocity against the gauze or the gauze against the gas, and by inclosing the flame of an oil lamp in a cage made of this gauze we are able to carry a light into an explosive mixture of air and gas without setting the gas on fire on the outside of the gauze; by this means an explosion is avoided. If we find ourselves with a safety lamp in an explosive atmosphere we should only try to put out the flame by carefully drawing down the wick and by no means try to blow it out or we might blow the flame through the gauze and cause an explosion. An explosion might result from drawing the flame of the lamp through the gauze by means of a tobacco pipe, yet workmen are not unfrequently detected in this very daring and dangerous practice in mines. Outside feeding, or oil tubes, used to be attached to safety lamps, but these are dangerous, as the flame might pass down the wick tube and up the oil tube and so fire the gas on the outside of the lamp, if the oil plug was out or fitted badly and the wick was small compared with the tube; but feeding tubes are not used now, at least in many districts. There are several sorts of safety lamps now more or less used, which give more light than the Davy lamp; glass being used in lieu of gauze opposite the flame. Glass is brittle and liable to crack from unequal expansion, and many persons do not think glass lamps so safe as the Davy, in consequence. The late George Stephenson contrived a safety-lamp having both glass and gauze around the flame, known as the Geordy or Stephenson lamp. The Davy lamp is perhaps the best known lamp for detecting the presence of a small mixture of fire-damps in the air of the mine.

Now, since fire-damps, choke-damp, and other gases are met with in more or less abundance in all coal mines it becomes an important question as to how the bad and often fatal effects they are likely to produce, if not properly dealt with, may best be avoided. To this end it has sometimes been proposed to get them to combine chemically with some substance to be presented to them as they are given off; and only a short time ago a Mr. Wall had a proposition of this kind before the public. So far, however, the best mode of dealing with them appears to be to dilute them with very large quantities of fresh air, and to sweep them out of the mine with an energetic ventilation as fast as they are given off or generated. After all, however, the natural laws and principles operating in the production of ventilation in mines have been less generally studied in England than on the continent; and from this cause many mistakes have been made in the practice of ventilation in this country, (England). New arrangements for the ventilation of mines have sometimes been made at a great cost, and have not been found to answer when completed. In a few cases lives have been lost from this cause; in others, an inferior arrangement and ventilation have been produced whereby the application of these natural principles, a superior one might have been obtained at the same or even at a smaller cost.

STRIKES AND LABOR TROUBLES.

Numerous strikes occurred last winter and spring in different parts of the State. The miners at Coalville, in Webster county, held a meeting and passed resolutions, demanding of the operators, as everything was on the advance, and the increasing demand for coal at an enhanced price entitled them to more pay for mining than they were receiving, for an advance of fifeeen cents per ton; the former price being one dollar. All the operators acceded to the demand with the exception of the operators of the Ft. Dodge Mines. They replied to the miners that they could not pay any more than they were then paying; that, while some of the coal had advanced in the market, their coal had not, as they had a contract on the railroad; and the railroad company would not advance the price above their contract; therefore they could not pay the miner any more. Miners never went into a strike under more favorable circumstances, as while on a strike they were working all the time in other mines. When they stopped work for the Ft. Dodge Coal Company, they went to work elsewhere, and when I was there in January, the mines of the Fort Dodge Company were lying idle on account of the strike, while all the men that wanted work, I was told, had got it, and were getting all they could do. The operators of the Ft. Dodge Mines saw that men with steady work could stand a strike for an indefinite time, and concluded to employ others to take the place of the men who had quit them. So they went to Tennessee, and brought about seventy-five colored men to work in the mines, offering them seventy-five cents per ton, while they had offered to pay the white men one dollar, but by this time the price of mining had advanced to $1.50 per ton, and the white miners told the colored men that if they would refuse to work they (the white men) would furnish them with everything they wanted to live on, which was agreed to by the colored men. So the strike continued. Subscriptions were raised at adjoining mines to help keep up the arrangements made, and Sambo gave concerts every night, and said this was a boss country, only a little bit cold. But all things have an end, and so had the good times for the colored men. When the warm weather came the small mines, relying on the local demand, (where the white men had been getting work,) had no sale for their coal, and work began to slacken; the men had idle days; and then the question arose, What are we going to do with the colored men? we have no money to send him back home; we can't keep him any longer, for we now have all we can do to keep our own families; and if we don't keep him he will go to work; so they concluded to let Sambo go to work, and all would go to work along with him. All through the three months' strike there was no attempt at violence, although reports to the contrary were frequently circulated.

When the news was circulated that Coalville had made a demand for an advance of wages, it went like an ocean wave all over the State, and when I was in Greene county the miners at the Keystone Mine struck twice in half a day. Through a mistake at a meeting the night previous, they had agreed to make a demand of 15 cents per ton advance; but the miners at this mine demanded only 12½ cents in the morning, which was acceded to, and the men went down to work; but the miners at the Armstrong Bro.'s Mine made a demand of 15 cents per ton, and their demand was rejected. So they sent a committee to the Keystone Mine, and when they made their statement to the men they came out again for the other 2½ cents per ton, which the operators paid, after stopping the mines some three or four days.

At Zenorsville, in the eastern part of Boone county, the miners made some four or five demands, at different times, until they brought the price of mining up from 4 to 6 cents per bushel; but none of the strikes were of any duration with the exception of the one at Coalville; as the operators either advanced the price of mining as soon as asked, or like the operators around Des Moines, paid it as soon as they became convinced that the miner was going to ask it. There was a strike at the Climax Mine in Boone county in the spring, of about five weeks duration, caused by the operators of the mine wanting to reduce the price of mining from $1.15 to $1.00 per ton. The miners refused to accept the reduction, and at the close of the strike they compromised by taking $1.00 per ton in summer, and $1.12½ in the winter.

A strike occurred at the Whitebreast Mines in the spring, in regard to a contract the coal company wanted the men to sign, which lasted considerable time. The mine-owners brought colored men to the mine to work in the place of the men on strike, when the white men concluded to sign the contract and resume work; and the colored men were returned home.

A strike was supposed to be under headway at the Albia Mine this summer, and the mine-owners in order to put a stop to it, discharged six men, and the miners were talking of demanding their reinstatement, when the company then discharged some twenty-five or thirty more men, and all has been quiet since.

Workmen have a right, either individually or in mass, to demand an advance in wages, and to refuse to work if the demand is not complied with; and they also have a right to refuse to accept a reduction in wages, and to call meetings and discuss questions affecting their interests, and to stop work if they think proper; but the operators also have rights. They have a right to discharge any man or company of men who do not suit them, and to employ men in their places, and where men are on strike the operators have a right to employ new men, on any conditions they choose, to take the place of the workmen on strike. And the rights of the one are as sacred as the rights of the other. But the system of strikes in settling disputes is all wrong. Not a year passes but we witness some conflict in which labor is arrayed against capital over the adjustment of wages, and it will continue to be so as long as the system of strikes prevails. Many a long strike, disastrous to both parties, could be avoided if men would allow their better judgment to have control. All the strikes of the last year in this State could have been settled before the suspension of work if the men had met the operators and talked over the situation in a friendly manner, like they did at What Cheer this summer, where the miners called a meeting to consult together on the subject of wages, and invited the operators to meet with them. The invitation was accepted by the mine-owners. They exchanged views on the subject of wages, and adopted the price of four cents per bushel from October 1, 1881, to April 1, 1882. Now this agreement was made in a few minutes, whereas by a strike it would have taken, perhaps, months to accomplish the same thing; and the circumstances are entirely different now than they would have been had there been a strike: the best of feeling prevails; the men have plenty of work, and all are prospering. If they had resorted to a strike, the men would have been out of work, and more or less suffering would have prevailed, and the operators would in all probability have lost their contracts in the market. Now all are prospering. This is the proper way to do, but if it is not practicable to meet in a body, let each side choose representative men, not rash and quick tempered, but men who could meet and discuss the situation and show figures if necessary to back up their arguments, and in that manner establish a board of arbitration, to which all disputes should be referred before talking of coming out on strike. Boards of arbitration have given good satisfaction in other States where they have been adopted, and could be made to work well in Iowa. Men are the same in this respect the world over. More can be done with them by reasoning than by threatening or trying to force them. Go to them before they become excited, and they can be persuaded to do things they would not do after their blood is hot.

MINERS' CONTRACTS.

The following are all the written contracts there are in the State under which the men are working. The other mines all work under a verbal contract.

This agreement, made and entered into this....day of....188–, by and between the .. Company as first party, and........as second party, witnesseth: That both parties hereto do hereby mutually covenant and agree to be governed in their relations with and to each other as employer and employe by the following

CONTRACT RULES.

1. The said first party shall employ the said second party in the coal mine of the said first party, in the capacity of a........and shall as near as practicable furnish him the opportunity to work as many days per month as the average of other employes working at similar work and under similar conditions in said mine.
2. The second party shall at such times as his services are required in the regular established working hours of said mine, report promptly on time and shall do and perform faithful and efficient work in said mine in the capacity of a....and when required by the pit-boss shall do any other service or work incidental and necessary to the working or safety of the mine, or produce to the pit-boss a good and sufficient reason for not doing so.

3. The said second party shall from the time he begins work under this agreement to the end of his term of service, whether at the time actually at work or not, use the utmost degree of care and caution to prevent and guard against any accident or injury to himself or any other person, or to any of the property of the said first party, in or about said mine, and shall report at once to the pit-boss or superintendent anything about the machinery, the mine or the operations thereof, that appears to him dangerous, in order that accidents may as far as possible be prevented in the perilous business in which the parties hereto are engaged.

4. The said second party hereby agrees that he will not take part in, or attend any general meeting of miners or employes held in the mine or on the premises of the said first party, unless such meeting shall have the sanction of the superintendent of the mine. And he further agrees that he will not stop work or join any strike or combination for the purpose of obtaining for himself or others, or causing the said first party to pay him or any of its employes, an advance of wages, nor will said second party in any way aid, abet, join with or countenance any strike, combination or scheme that shall in purpose or effect injure or impede the business of the said first party, nor will the said second party interfere in any manner, by threats, menaces or otherwise with the right of any person to work in any way and upon any terms and with whom said person may deem proper, nor will the said second party interfere in any way with the just right of the said first party to employ, retain or discharge any person or persons whom the said first party may choose to employ.

5. The wages of said second party shall be at the rate of ... cents per bushel from the date hereof until October first 188 , and .... cents per bushel from October first 188 until May first, 188 . A "bushel" under this contract meaning eighty pounds of screened coal, weighed after passing over the main or upper screens now in use at said coal mine, the coal to be cleaned by the miner (before loading it in pit-cars) of all impurities such as slate, sulphur, clay, stone and blackjack. And the said first party shall pay the second party monthly at this rate, on the Saturday nearest to the fifteenth day of each month, for the preceding month's earnings, unless sooner paid, or unless the said second party shall have forfeited his pay or any part thereof by breaking or violating his agreements as set forth in rule 4 of this agreement.

6. All tools, implements or machinery belonging to said first party that shall be used by said second party in the mine shall be properly and carefully handled and used by him, and when not in use shall be placed by him in a safe part of the works, and any loss or breakage occurring to such tools or implements shall be paid for by said second party out of his wages, unless such loss or breakage shall be proven to have been unavoidable on the part of said second party.

7. It is distinctly agreed by both parties hereto and this agreement is made with the express understanding that in case the said second party breaks, violates or infringes any of the agreements and

stipulations set forth in rule 4 hereof, that he shall forfeit to the said first party a sum of money equal to fifteen days full wages at the rate specified in rule 5, and said first party shall retain said amount from the wages of said second party, for the use and benefit of the said first party forever.

8. Nothing in this agreement shall be construed to prevent the said first party from discharging the said second party at any time and thus terminating this agreement, or to prevent the said second party from quitting the employ of said first party at any time except when a strike or general stoppage of work is impending or in progress.

It is mutually agreed that this agreement shall be and remain in force from the date hereof until May 1st, 188–.

In testimony whereof, we have hereto set our hands at Des Moines, Iowa, on the day and date first above written.

MINERS' CONTRACT.

This agreement, made this .... day of ... , A. D. 1881, between the Whitebreast Coal and Mining Company, party of the first part, and ......, party of the second part.

Witnesseth, That the party of the second part agrees to enter into the employment of the party of the first part as a miner of coal. The party of the first part agrees to pay the party of the second part for each ton of coal mined by him and delivered on pit-cars at the face of the room where the same is mined, eighty-seven and one-half (87½) cents per ton for lump coal, from the first day of April, 1881, to the first day of April, 1882. All coal to be weighed after passing over the screens in use for time being, such screens not to be different from those now in use, as regards length or space between the bars. The party of the first part reserves the right of closing the mines at any time, or of discharging such miners as it may think proper, including said second party.

And the party of the second part agrees that he will not stop work, or join any "strike" or combination against the party of the first part, for any purpose whatever, during the term of the contract, which is from April 1st, 1881, to April 1st, 1882.

In witness whereof, the parties have hereunto set their hands, this .... day of ...., 188–.

WHITEBREAST COAL AND MINING CO.

CHICAGO AND VAN METER COAL COMPANY—LABOR CONTRACT.

I, ..., hereby agree with the Chicago and Van Meter Coal Co., to work for said coal company, as a miner, in its coal mine at Van Meter, Iowa, in the capacity of operator of a machine for under-cutting coal, said machine to be propelled by compressed air power, and is known as the "Harrison Mining Machine," and to be operated in the mines of the said Chicago and Van Meter Coal Co., at

Van Meter, Iowa, terms and conditions to be as follows; to-wit, For the first fifteen (15) square yards under-cut in any one day, fifteen cents per yard, and for all in excess of fifteen square yards under-cut in any one day, twelve and one-half (12½) cents per square yard. The said coal company to guarantee for the first fifteen days an earning of two dollars ($2.00) per day, and at the expiration of the fifteen days I am to be privileged to accept the above schedule of rates (waiving the guarantee of said company) for a term of not less than.... months or abandon the job, as I may elect. The said coal company, on its part agrees to pay the above rate of compensation so long as the said........shall well and faithfully perform the duties of said position, and to the satisfaction of the superintendent in charge of said mines. Payment to be made according to usage now and heretofore practiced by said coal company; to-wit, On the fifteenth day of each month for all labor performed in and during the preceding calendar month. And in consideration of above named compensation I further agree that I will, in every way consistent, work to the best of my ability, in the interests of said coal company, acting under the general direction of the superintendent in charge. That I will in no manner, directly or indirectly, join with or encourage any miners' strike, or join any miners' union or do any acts whatever calculated to interrupt, hinder, or in any way interfere with the continuous working of said mine. That I will not, while in the employ of said company, as an operator of one of said mining machines be governed by any strike, or effort of any kind to interrupt, delay or hinder work in said mine by men employed in other capacities in and about said mine. But in case of a strike on the part of any or all the men employed in other capacities in and about said mine, I agree to continue the work of mining individually, or with others occupying similar positions as myself, to the best of my ability, same as though no strike had occurred. I further agree that I will serve said coal company as above for the term of.... unless sooner discharged, reserving to myself the right to end this contract at any time by giving fifteen days' notice in writing to the superintendent in charge.

CHICAGO AND VAN METER COAL COMPANY.

CHICAGO AND VAN METER COAL COMPANY—LABOR CONTRACT.

I,......, hereby agree with the Chicago and Van Meter Coal Co., to work for said coal company in its coal mine at Van Meter, Iowa, in the capacity of....for which I am to receive compensation as follows:....which rate of compensation the said coal company hereby agrees to pay so long as the said ...shall well and faithfully perform the duties of said position, and to the satisfaction of the superintendent in charge of said mines. Payment to be made according to usage now and heretofore practiced by said coal company; to-wit, On the fifteenth day of each month for all labor performed in and during the preceding calendar month. And in consideration of above named compensation I further agree that I will, in every way consistent, work to the best of my ability in the interests of said coal company, acting under the general direction of the superintendent in charge. That I will in no manner, directly or indirectly, join with or encourage any miners' strike, or join any miners' union, or do any act whatever calculated to interrupt, hinder, or in any way interfere with the continuous working of said mine. That I will not while in the employ of said company be governed by any strike, or effort of any kind to interrupt, delay or hinder work in said mine by men employed in other capacities in and about said mine. But in case of a strike on the part of any or all the men employed in other capacities in and about said mine, I agree to continue my work individually, or with others occupying similar positions as myself, to the best of my ability, same as though no strike had occurred. I further agree that I will serve said coal company as above for the term of.... unless sooner discharged, reserving to myself the right to end this contract at any time by giving fifteen days, notice in writing to the superintendent in charge.

CHICAGO AND VAN METER COAL CO.

MINERS' UNIONS.

Miners' unions are looked upon by some with distrust; but a miners' union conducted properly is a blessing to all who have anything to do with it. I do not have reference to unions whose sole object is to keep the price of wages to the highest possible point the market will afford; which is proper in its place, but should not be the sole object in life. I speak of those which have a tendency to improve the miners' condition in life. There are many men working in the mines who dislike mining and would not follow it if they were qualified to follow anything else, but they were taken to labor in the mines as soon as they were large enough to be of any benefit to their fathers, and in that way deprived of the privilege of school. There are plenty of young men who would gladly avail themselves of the chance of attending school if it were possible for them to do so and continue their work. Therefore the operators should encourage night schools, and help to furnish a room for a reading-room, and assist in procuring a library. It would repay them tenfold. The men would soon become interested, and instead of spending their time and money in worse than foolishness, around the saloons, they would be studying some useful and instructive books. This could be done in such a manner that no one would feel the loss of the amount contributed. Let the miners and the operators each give a percentage of their earnings, to be paid every month, the whole amount to be a general fund, and each person contributing to be a member, no matter where he is, so long as he keeps his monthly dues paid; the general fund to be used in cases of distress among members of the union; for instance, if a member gets sick or disabled, pay him a certain amount per week, and his doctor bill, until he is able to go to work again, or if one of the members die pay his funeral expenses.

A union of this kind would not only be a blessing in relieving distress, but would soon accumulate libraries that would be an honor to the State in which it existed. Unions of this or similar kinds are operating with good results in other places. Andrew Ray, Mine Inspector of Ohio, gives an instance of one in successful operation, in his report for the year 1880, which I will copy. In that report, under the head of "Miners' Unions," he says :

> "The miners of the State do not improve their opportunities for the amelioration of their condition in life. There are miners in every district of the State of philanthropic views, fine intelligence, and sound judgment, who, with properly directed effort, might become real benefactors of their fellows, and leave the world better than they found it. All their energies seem directed to organizations for maintaining the price of mining at the highest point the coal market will afford the operators to pay. This is all right and proper in itself, but is by no means the sole duty of life. The establishment of night schools, of libraries and reading rooms, of Sunday-schools and churches, open a wide field of usefulness. In those districts of the State, and of every State where there are intelligence and sobriety; where there are reading rooms and libraries; and where saloons are few and far between, there are greater contentment, better wages paid, and fewer strikes, than where ignorance and saloons prevail.
>
> "The miners of Germany have superb organizations, which deserve to be studied by the miners of Ohio and other States. These unions have brought contentment to the German miner, and might be adopted by the miners of the United States with advantage, and in their formation the operators of the mines ought to lend a helping hand.
>
> "The miners' unions of Germany are the oldest associations of the kind in the world, having originated in the silver mines of the Hartz Mountains more than six hundred years ago, and they now extend over every mining country of continental Europe, receiving corporate rights from government. The system has been perfected in Prussia, and is simply admirable. Every miner or member of

the union, is required by law to contribute three and one-half per cent of his earnings, and the owner or operator one per cent of the yield of the mine, into the benefit fund of the association, and the money thus collected is applied in payment to members during periods of sickness or disability resulting from accident in the mines.

"The members of the union are divided into two classes—permanent members and temporary members. Temporary members only possess personal rights, while permanent members, who become such after having belonged to the union for five years, have their rights in the association extended to all their family. Members forfeit their rights to any benefit fund, and in fact cease to be longer members, when they refuse to pay their regular monthly contribution. All the funds of the union are under the control of the inspector of mines, who is responsible for all defalcations and who is also obliged by law to see that all members are fairly treated. Any miner who belongs to the union, who may be hurt in the mines in the pursuit of his calling, or who may become sick and unable to work from any natural cause, draws pay from the funds of the association during the whole time he is off work, and he also receives medical assistance free of charge. Should accident or disease prevent a member from working in the mines, or when a member is no longer able to work, through old age, he draws a life pension in consequence, and after his death his widow receives a monthly pension till she marries again, and all his children draw pensions until each arrives at the age of fourteen years. When a member is killed in the mines, or dies from any cause, the association pays all funeral expenses. There is no compulsion exercised to get members to join; the union is simply and only a benevolent association like the Free Masons or Odd Fellows, except that there is no secrecy about its operations. It partakes in no sense of a trades' union organization, associations of this character being contrary to law until the year 1869, when the ban was removed forever.

"The result of such legislation has made the miner of Germany proud of his occupation. He is as proud as a miner, is a common proverb. Very few German miners ever emigrate to this country, being secured by their superb organization against want in their old age Thousands of Germans work in the coal mines of the United States; but question them, and you will find that they, with rare exceptions, never saw a coal mine in Fatherland. Were organizations of a character similar to these established in the mining regions of this State, and facilities provided for the education of the boys and young men of the mines, strikes would soon become as scarce as they are now common; and instead of the sheriff of the county being required to call upon the Governor of the State every few months for aid to quell some threatened disturbance against persons and property, the miners through the vast influence which their intelligence and numbers would give them, would be sending representatives to the State legislature to make laws which we are all—sheriff and governor included—bound to obey. The proper adjustment of the relations of labor and capital can only come through increased intelligence, sobriety, firm union, and moderation on the part of employes. The workingman, if left to his own resources, will not, as a general rule, seek to improve his condition in this country, for the tendency in all countries where wage-laborers are paid good wages is to produce thoughtlessness as to the future. The labor question, to which little or no attention is paid by our philanthropists and statesmen, is one of the gravest questions of the future. The growth of intelligence among our workmen must keep pace with the increased demands of individual restraint. Reason, not bayonets, is demanded by our age and nation. Workingmen must govern themselves and respect the laws and rights of others. Only in this way can civil liberty continue.

"As illustrating the influence upon the habits of miners in the maintenance of reading rooms and libraries in their midst, I need only refer to the condition of the mines in Washingtonville, in Columbiana county. Twelve years ago the Cherry Valley Iron and Coke Company joined their workmen in the erection of a mining institute. Since that time a mule-driver and a coal-digger have studied law, and been admitted to the bar, and are building up a lucrative practice; another coal digger has graduated at the Cleveland Medical College and is rapidly acquiring practice in his new profession, while a number of others are school teachers, all of whom owed the inspiration of bettering their condition in life to their educational surroundings. The miners of this place are among the most sober, intelligent, and industrious citizens to be found in any calling. There are few strikes there, because reason is used in the adjustment of wages disputes. The mines are well ventilated, and the miners and operators regard each other as common friends, mutually dependent upon each other. This state of affairs ought to exist everywhere. There should be no strikes or lockouts. They belong to the old world, and should be frowned down in a free country."

APPENDIX.

APPENDIX.

IOWA STATE MINING LAW.

Be it enacted by the General Assembly of the State of Iowa:

SECTION 1. That there shall be appointed by the Governor, with the advice and consent of the Senate, one State Mine Inspector, who shall hold his office for two years; subject, however, to be removed by the Governor for neglect of duty or malfeasance in office. Said inspector shall have a theoretical and practical knowledge of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, and of mining engineering; and said inspector, before entering upon the discharge of his duties, shall take an oath or affirmation to discharge the same faithfully and impartially, which oath or affirmation shall be indorsed upon his commission, and his commission so indorsed shall be forthwith recorded in the office of the Secretary of State; and such inspector shall give bonds in the sum of two thousand dollars ($2,000), with sureties to the approval of the Governor, conditioned for the faithful discharge of his duty.

SEC. 2. Said inspector shall give his whole time and attention to the duties of his office, and shall examine all the mines in this State as often as his duties will permit, to see that the provisions of this act are obeyed; and it shall be lawful for such inspector to enter, inspect and examine any mine in this State, and the works and machinery belonging thereto, at all reasonable times, by night or by day, but so as not to unnecessarily obstruct or impede the working of the mines; and to make inquiry and examination into the state and condition of the mine as to ventilation and general security as required by the provisions of this act. And the owners and agents of such mines are hereby required to furnish the means necessary for such duty and inspection, of which inspection the inspector shall make a record, noting the time and all the material circumstances; and it shall be the duty of the person having charge of any mine whenever any loss of life shall occur by accident connected with the workings of such mine, or by explosion, to give notice forthwith by mail or otherwise to the inspector of mines, and to the coroner of the county in which such mine is situated, and the coroner shall hold an inquest on the body of the person or persons whose death has been caused and inquire carefully into the cause thereof, and shall return a copy of the verdict and all testimony to said inspector. No person having a personal interest in, or employed in the management of, or employed in the mine where a fatal accident occurs, shall be qualified to serve on the jury impaneled on the inquest.

SEC. 3. Said inspector while in office shall not act as an agent or as a manager or mining engineer, or be interested in operating any mine, and he shall annually, on or before the first day of January, make a report to the Governor of his proceedings and the condition and operations of the mines in this State, enumerating all accidents in or about the same, and giving all such information as he may think useful and proper, and making such suggestions as he may deem important as to further legislation on the subject of mining.

SEC. 4. Said inspector shall receive a salary of fifteen hundred dollars per annum, to be paid in quarterly installments, and he shall have and keep an office in the State House at Des Moines in which shall be kept all records and correspondence, papers, and apparatus and property pertaining to his duties, belonging to the State, and which shall be handed over to his successor in office.

SEC. 5. Any vacancy occurring when the Senate is not in session, either by death or resignation, removal by the Governor or otherwise, shall be filled by appointment by the Governor which appointment shall be good until the close of the next session of the Senate, unless the vacancy is sooner filled as in the first section provided.

SEC. 6. There shall be provided for said inspector all instruments necessary for the discharge of his duties under this act, which shall be paid for by the State, on the certificate of the inspector, and shall be the property of the State.

SEC. 7. The owner or agent of every coal mine shall make or cause to be made, an accurate map or plan of the working of such mine on a scale of not less than one hundred feet to the inch showing the area mined or excavated. Said map or plan shall be kept at the office of such mine. The owner or agent shall on or before the first day of September, 1880, and annually thereafter, cause to be made a statement and plan of the progress of the workings of such mine up to said date which statement and plan shall be marked on the map or plan herein required to be made. In case of refusal on the part of said owner or agent for two months after the time designated to make the map or plan or the addition thereto the inspector is authorized to cause an accurate map or plan of the whole of said mine to be made at the expense of the owner thereof, the cost of which shall be recoverable against the owner in the name of the person or persons making said map or plan.

SEC. 8. After six months from the passage of this act it shall not be lawful for the owner or agent of any coal mine operated by shaft or slope to employ more than fifteen persons at one time to work therein or permit more than fifteen persons at one time to work in such mine, unless there are to every seam of coal worked in such mine two separate outlets separated by natural strata of not less than fifty feet in breadth by which shafts or outlets distinct means of egress must be always available to afford easy escape from such mine in case of explosion, cavings or falling in of either shaft. But, in case of mines operated as in this section first provided, if in the judgment of the inspector an additional shaft is deemed necessary then the same shall be provided subject, however, to the decision of the circuit court of the county in which the mine is situated.

SEC. 9. All mines hereafter opened shall be allowed one year to make outlets as provided in section 8 when such mine is under two hundred feet in depth, and two years when such mine is over two hundred feet, but not more than twenty men shall be employed in such mines at one time until the provisions of section 8 are complied with, and after the expiration of the periods above mentioned should said mines not have the outlets aforesaid they must reduce their number to fifteen persons.

SEC. 10. It shall be the duty of said inspector to see that all coal mines are well and properly ventilated and that such quantities of air are supplied to the miners at their several places of working in each mine as is requisite for their health and safety.

The ventilation required by this section may be produced by any suitable appliances, but in case a furnace is used for ventilating purposes, it shall be built in such a manner as to prevent the communication of fire to any part of the works by lining the upcast with incombustible material for a sufficient distance up from said furnace.

SEC. 11. The owner or agent of every coal mine operated by a shaft or slope, in all cases where the human voice cannot be distinctly heard, shall forthwith provide and maintain a metal tube or other suitable means for communication from the top to the bottom of said shaft or slope, suitably calculated for the free passage of sound therein, so that communication can be held between persons at the bottom and top of the shaft or slope, and there shall be provided a sufficient cover overhead on all carriages used for lowering and hoisting persons, and on the top of every shaft an approved safety-gate and also approved safety-spring on the top of every slope, and an adequate brake shall be attached to every drum or machine used for raising or lowering persons in all shafts or slopes, and a trail shall be attached to every car used on a slope, all of said appliances to be subject to the approval of the inspector.

SEC. 12. No owner or agent of any coal mine operated by shaft or slope shall knowingly place in charge of any engine used for lowering into or hoisting out of such mine persons employed therein, any but experienced, competent and sober engineers, and no engineer in charge of such engine shall allow any person except such as may be deputed for that purpose by the owner or agent, to interfere with it or any part of the machinery, and no person shall interfere or in any way intimidate the engineer in the discharge of his duties, and the maximum number of persons to ascend out of or descend into any coal mine on one cage shall be determined by the inspector, but in no case shall such number exceed ten, and no person shall ride upon or against any loaded cage or car in any shaft or slope.

SEC. 13. No boy under twelve years of age shall be allowed to work in any mine, and it shall be the duty of the agent of such mine to see that the provisions of this section are not violated.

SEC. 14. In case any coal mine does not in its appliances for the safety of the persons working therein, conform to the provisions of this act, or the owner or agent disregards the requirements of this act for twenty days after being notified by the inspector and court of competent jurisdiction in session or vacation, may, on application of the inspector, by civil action in the name of the State, enjoin or restrain the said owner or agent from working or operating such mine with more than ten miners at once until it is made to conform to the provisions of this act, and such remedy shall be cumulative and shall not take the place of, or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 15. Any miner, workman, or other person who shall knowingly injure or interfere with any air-course or brattice, or obstruct, or throw open doors or disturb any part of the machinery, or disobey any order given in carrying out the provisions of this act, or ride upon a loaded car or wagon in a shaft or slope, or do any act whereby the lives and health of the persons or the security of the mines and machinery is endangered, or if any miner or person employed in any mine governed by the provisions of this act shall neglect or refuse to securely prop or support the roof and entries under his control or neglect or refuse to obey any order given by the superintendent in relation to the security of the mine in the part of the mine under his charge or control, every such person shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding one hundred dollars or imprisonment in the county jail not exceeding thirty days.

SEC. 16. Whenever written charges of gross neglect of duty or malfeasance in office against any inspector shall be made and filed with the Governor signed by not less than fifteen miners or one or more operators of mines together with a bond in the sum of five hundred dollars payable to the State and signed by two or more responsible freeholders and conditioned for the payment of all costs and expenses arising from the investigation of such charges it shall be the duty of the Governor to convene a board of examiners to consist of two practical miners, one mining engineer and two operators at such time and place as he may deem best, giving ten days' notice to the inspector against whom charges may be made and also the person whose name appears first in the charges, and said board when so convened and having first been duly sworn or affirmed truly to try and decide the charges made shall summon any witness desired by either party and examine them on oath or affirmation which may be administered by any member of the board and depositions may be read on such examination as in other cases, and report the result of their investigations to the Governor and if their report shows that said inspector has grossly neglected his duties or is incompetent or has been guilty of malfeasance in office it shall be the duty of the Governor forthwith to remove said inspector and appoint a successor, and said board shall award the costs and expenses of such investigation against the inspector or the person signing said bond.

SEC. 17. In all coal mines in this State the miners employed and working therein shall at all proper times have right of access and examination of all scales, machinery or apparatus used in or about said mine to determine the quantity of coal mined for the purpose of testing the accuracy and correctness of all such scales, machinery or apparatus, and such miners may designate or appoint a competent person to act for them, who shall at all proper times have full right of access and examination of such scales, machinery or apparatus and seeing all weights and measures of coal mined and the accounts kept of the same provided not more than one person on behalf of the miners collectively shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such person shall make no unnecessary interference with the use of such scales, machinery or apparatus.

SEC. 18. The owner, agent, or operator of any coal mine shall keep a sufficient supply of timber where required to be used as props so that the workmen may at all times be able to properly secure the workings from caving in, and it shall be the duty of the owner, agent or operator to send down all such props when required.

SEC. 19. The provisions of this act shall not apply to or affect any coal mines in which not more than fifteen persons are employed at the same time. *Provided*, that upon the application of the proprietors of or miners in any such mine the inspector shall make or cause to be made an inspection of such mine and direct and enforce any regulations in accordance with the provisions of this act that he may deem necessary for the safety or the health and lives of the miners.

SEC. 20. Chapter 31, acts of the Fifteenth General Assembly is hereby repealed.

Approved, March 30, 1880.

OHIO MINING LAW AS AMENDED.

SEC. 290. The inspector of mines shall be appointed by the Governor by and with the advice and consent of the Senate, and shall hold his office for four years, and no person shall be appointed unless he is possessed of a competent knowledge of chemistry, geology and minerology and has a practical knowledge of mining, engineering and of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp.

SEC. 291. Before entering upon the discharge of the duties of the office the inspector shall give bonds to the State in the sum of five thousand dollars with sureties to be approved by the Governor conditioned for the faithful performance of his duties. The bonds with his oath of office and approval of the Governor indorsed thereon shall be forthwith deposited with the Secretary of State.

SEC. 292. The inspector shall give his whole time and attention to the duties of his office and shall examine all the mines in the State as often as his other duties will permit, to see that the provisions of this chapter are obeyed; and the inspector may enter, inspect and examine any mine in the State and the works and machinery belonging thereto at all reasonable times by night or by day but so as not to unnecessarily obstruct or impede the working of the mine and to make inquiry into the state and condition of the mine as to ventilation and general security, and the owner and agent of such mine are hereby required to furnish the means necessary for such entry and inspection, of which inspection the inspector shall make a record, noting the time and all the material circumstances; and the person having charge of any mine whenever loss of life occurs by accident connected with the working of such mine or by explosion shall give notice forthwith by mail or otherwise to the inspector of mines and to the coroner of the county in which the mine is situated who shall hold an inquest upon the body of the person or persons whose death has been caused and inquire carefully into the cause thereof and shall return a copy of the finding and all the testimony to the inspector.

SEC. 293. The inspector while in office shall not act as an agent or as a manager or mining engineer or be interested in operating any mine, and he shall annually make a report to the Governor of his proceedings and the condition and operation of the mines of the State, enumerating all accidents in or about the same and giving all such other information as he thinks useful and proper, and making such suggestions as he deems important as to further legislation on the subject of mining.

SEC. 294. The inspector shall have an office in the State House in which shall be carefully kept the maps and plans of all mines in the State and all records and correspondence, papers and apparatus and property pertaining to his duties belonging to the State and which shall be handed over to his successor in office.

SEC. 295. There shall be provided for the inspector all instruments and chemical tests necessary for the discharge of his duties under this chapter which shall be paid for on the certificate of the inspector and which shall belong to the State.

SEC. 296. The owner or agent of every coal mine shall make or cause to be made an accurate map or plan of the workings of such mine on a scale of not less than one hundred feet to the inch showing the area mined or excavated and the location and connection with such excavation of the mine of the lines of all adjoining lands and the name or names of each owner or owners so far as known marked on each tract, a true copy of which map the owner or agent shall deposit with the inspector, and another copy of which shall be kept at the office of such mine, and the owner or agent shall every four months thereafter file with the inspector a statement and plan.

of the workings of such mine up to that date which statement and plan shall be so prepared as to enable the inspector to mark the same on the original map or plan herein required to be made, and in case of refusal on the part of the owner or agent to make and file the map or plan, or the addition thereto, the inspector is authorized to cause an accurate map or plan of the whole of said mine to be made at the expense of the owner thereof, the cost of which shall be recoverable against the owner in the name of the person or persons making the map or plan which shall be made in duplicate, one copy being delivered to the inspector and the other left in the office of the mine; and he shall, on being paid the proper costs thereof on demand of any person interested in the working of such mine or owner of adjoining lands, furnish an accurate copy of any map or plan of the working of such mine.

Sec. 297. It is unlawful for the agent or owner of any coal mine worked by a shaft wherein over 15,000 square yards have been excavated, to employ or permit any person to work therein, unless there are to every seam of coal worked in each mine at least two separate outlets separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available to the persons employed in the mine, but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until 15,000 yards have been excavated in such mines, and to all other coal mines, whether slopes or drifts, two such openings or outlets must be provided within twelve months after fifteen thousand yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for the agent or owner of such mine to permit more than ten persons to work therein at any one time. In case a coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein and the owner thereof does not own suitable surface-ground for another opening, he may select and appropriate any adjoining land for that purpose, and for approach thereto, and shall be governed in his proceedings in appropriating such land by the provisions of law in force providing for the appropriating of private property by corporations, and such appropriations may be made whether he is a corporator or not; but no land shall be appropriated under the provisions of this chapter until the court is satisfied that suitable premises cannot be obtained by contract upon reasonable terms.

Sec. 298. The owner or agent of every coal mine, whether shaft, slope or drift, shall provide and maintain for any such mine an amount of ventilation not less than 100 cubic feet per minute per person employed in such mines, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless, and expel the poisonous and noxious gases from each and every working place in the mine, and no working place shall be driven more than 120 feet in advance of a break-through or air-way; and all break-throughs or air-ways, except those last made near the working places of the mine, shall be closed up and made air-tight by brattice, trap-doors, or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the mine where the persons employed in such mine are at work, and all mines governed by the statutes shall be provided with artificial means of producing ventilation, such as forcing or suction fans, exhaust steam, furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air, and all mines generating fire-damp shall be kept free of standing gas, and every working place shall be carefully examined every morning with a safety lamp by a person or persons before any of the workmen are allowed to enter the mine.

SEC. 299. The owner or agent of every coal mine operated by shaft, in all cases where human voice cannot be distinctly heard, shall forthwith provide and maintain a metal tube from the top to the bottom of such shaft suitably calculated for the free passage of sound therein so that conversation may be held between persons at the bottom and top of the shaft, and there shall also be provided an approved safety-catch and a sufficient cover overhead on all carriages used for lowering or hoisting persons, and in the top of every shaft an approved safety gate, and an adequate brake shall be attached to every drum or machine used for lowering or raising persons in all shafts or slopes.

SEC. 300. No owner or agent of any coal mine operated by a shaft or slope shall place in charge of any engine used for lowering into or hoisting out of such mine persons employed therein any but experienced, competent and sober engineers, and no engineer in charge of such engine shall allow any person except such as may be deputed for that purpose by the owner or agent to interfere with it or any part of the machinery, and no person shall interfere or in any way intimidate the engineer in the discharge of his duties, and in no case shall more than ten men ride on any cage or car at one time, and no person shall ride upon a loaded cage or car in any shaft or slope.

SEC. 301. All safety-lamps used for examining coal mines or which are used in any coal mine shall be the property of the owner of the mine and shall be under the charge of the agent thereof, and in all mines whether they generate fire-damp or not the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will shut of their own accord and cannot stand open, and the mining boss shall keep a careful watch over the ventilating apparatus and the air-ways, and he shall measure the ventilation at least once a week at the inlet and outlet, and also at or near the face of all the entries, and the measurements of air so made shall be noted on blanks furnished by the mine inspector; and on the first day of each month the mining boss of each mine shall sign one of such blanks properly filled with the actual measurements and forward the same to the mine inspector.

SEC. 302. No boy under twelve years of age shall be allowed to work in any mine, nor any minor between the ages of twelve and sixteen years unless he can read and write and in all cases of minors applying for work the agent of such mine shall see that the provisions of this section are not violated.

SEC. 303. In case any coal mine does not, in appliances for the safety of the persons working therein, conform to the provisions of this chapter or the owner or agent disregards the requirements of this chapter, any court of competent jurisdiction may on application of the inspector by civil action in the name of the State enjoin or restrain the owner or agent from working or operating such mine with more than ten miners at once until it is made to conform to the provisions of this chapter; and such remedy shall be cumulative and shall not take the place of or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 304. Whenever written charges of gross neglect of duty or malfeasance in office against any inspector is made and filed with the Governor signed by not less than fifteen coal miners or one or more operators of mines together with a bond in the sum of five hundred dollars, payable to the State and signed by two or more responsible freeholders and conditioned for the payment of all costs and expenses arising from the investigation of such charges the Governor shall convene a board of examiners to consist of two practical coal miners, one chemist, one mining engineer and one operator at such time and place as he deems best, giving ten days' notice to the inspector or against whom the charges are made and also to the person whose name appears first in the charges, and the board when so convened and having been first duly sworn truly to try and decide the charges made shall summon any witnesses so desired by either party and examine them on oath which may be administered by any member of the board and depositions may be read on such examination as in other cases and the board shall examine fully into the truth of such charges and report the result of their investigation to the Governor, and the board shall award the costs and expenses of such investigation against said inspector or the persons signing the bond according to their finding against said inspector or in his favor which costs and expenses shall include the compensation of such board of five dollars per day for each member for the time occupied in the trial and in traveling from and to their homes, and the Attorney-general shall forthwith proceed to collect such costs and expenses and pay the same into the State treasury, being in the first instance paid out of the State treasury, on the certificate of the president of such board.

SEC. 305. In all coal mines in the State the miners employed and working therein, the owners of the land, or other persons interested in the rental or royalty of any such mine, shall at all proper times have full right of access and examination of all scales, machinery, or apparatus used in or about such mine to determine the amount of coal mined for the purpose of telling the accuracy and correctness of all such scales, machinery, or apparatus; and such miners, land-owners, or other persons may designate or appoint a competent person to act for them who shall at all proper times have full right of access and examination of such scales, machinery, or apparatus, and seeing all weights and measures of coal mined and the accounts kept of the same; but not more than one person on behalf of the miners collectively, or one person on behalf of the land-owners or other persons interested in the rental or royalty jointly shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such persons will make no unnecessary interference with the use of such scales, machinery, or apparatus; and the miners employed in any mine may from time to time appoint two of their number to act as a committee to inspect, not oftener than once in every month, the mine and the machinery connected therewith, and to measure the ventilation current, and if the owner, agent, or manager so desires he may accompany said committee by himself or two or more persons which he may appoint for that purpose; the owner, agent or manager shall afford every necessary facility for making such inspection and measurements, but the committee shall not in any way interrupt or impede the work going on in the mine at the time of such inspection and measurement, and said committee shall within ten days after such inspection and measurements, make a correct report thereof to the inspector of mines, on blanks, to be furnished by said inspector for that purpose, and if such committee make to the inspector a false or untrue report of the mines, such act will constitute a violation of this section.

SEC. 306. The provisions of this chapter shall not apply to or effect any coal mine in which not more than ten men are employed at the same time, but on the application of the proprietor of or miners in any such mine, the inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this chapter, that he deems necessary for the safety of the health and lives of miners.

SEC. 306. (*a*). The inspector of mines, may, with the approval of the Governor, appoint an assistant, who shall be a practical miner of not less than five years' experience, and who shall perform such duties as may be required by the inspector, and receive a salary at the rate of twelve hundred dollars ($1,200) per annum, and the inspector may, with the consent of the Governor, remove such assistant at pleasure and appoint a successor, and may allow the assistant traveling expenses out of his contingent fund.

SEC. 6,871. Whoever knowingly violates any of the provisions of sections 298, 299, 300, 301, 302 and 305 of the revised statutes, or does any act whereby the lives or health of the persons or the security of any mine and machinery are endangered, or any miner or other person employed in any mine governed by the statute, who intentionally and willfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of a mine in relation to the security of the mine in the part thereof where he is at work, and for fifteen feet back from the face of his working place, shall be fined not less than fifty dollars, or imprisoned in the county jail not less than thirty days, or both.

PENNSYLVANIA MINING LAW.

AN ACT providing the means for securing the health and safety of persons employed in the bituminous coal mines of Pennsylvania.

SECTION 1. *Be it enacted*: That the owner or agent of every bituminous coal mine or colliery, shall make, or cause to be made, within six months after the passage of this act, an accurate map or plan of the working of such coal mine or colliery on a scale not exceeding one hundred feet to the square inch, and showing the bearing and distances, which shall be kept for use of the inspector in the office at the mine of said coal mine or colliery; and said owner or agent shall cause on or before the 10th of January in every year a plan of the progress of the working of such coal mine during the year past, to be marked on original map or plan of the said coal mine or colliery, and the inspector shall have the right at all times to have possession of any such map or plan at the mines to draw a copy therefrom for his own convenience: *Provided*, If the owner or agent of any coal mine shall neglect or refuse or from any cause fail for the period of two months after the time prescribed, to furnish the map or plan as hereby required, or if the inspector shall find or have reason to believe that any map or plan of any coal mine furnished in pursuance of the provisions of this act is materially inaccurate or imperfect, he is hereby authorized to cause a correct map or plan of the actual workings of said coal mine to be made at the expense of the owner thereof, the cost of which shall be recoverable from said owner as other debts are recoverable by law: *Provided*, That if the map or plan which he claimed to be incorrect shall prove to have been correct then aforesaid expenses shall be paid by the said inspector and may be recovered from him in like manner.

SEC. 2. It shall not be lawful after six months from the passage of this act for the owner or agent of any bituminous coal mine to employ any person at work within said coal mine or permit any person to be in said coal mine for the purpose of working therein unless they are in communication with at least two openings separated by natural strata of not less than one hundred and fifty feet in breadth, if the mine be worked by shaft or slope, and of not less than twenty-four feet, if the mine be worked by drift: *Provided*, If the mine be worked by drift, two openings inclusive of air-shaft, shall only be required, if the air-shaft can be used for ingress and egress in case of emergency; that not more than twenty persons shall employed in the mine at any one time after the expiration of the six months until the second opening shall be reached and made available; and in case of furnace ventilation being used before the second opening is reached, the furnace shall not be placed within forty feet of the foot of the shaft and shall be well secured from danger from fire by brick or stone walls of sufficient thickness and the mine while being driven for making and perfecting a second opening; the owner or agent shall provide and maintain a metal tube from the top to the bottom of the slope or shaft suitably adapted to the free passage of sound through which conversation may be held between persons at the bottom and at the top of the shaft or slope; also the ordinary means of signaling to and from the top and bottom of the shaft or slope, and an approved safety-catch, and sufficient cover overhead on every carriage used for lowering and hoisting persons; and the said owner or agent shall see that sufficient flanges or horns are attached to the sides of the drum of every machine that is used for lowering and hoisting persons in and out of the mine, and also that adequate brakes are attached thereto; the main link attached to the swivel of the wire rope shall be made of the best quality of iron, and shall be tested by weights or otherwise satisfactory to the inspector of mines of the district, and bridle chains shall be attached to the main link from the cross pieces of the carriage and no single link chain shall be used for lowering or raising persons into or out of said mine, and not more than six persons shall be lowered or hoisted by the machinery at any one time and only sober, competent and experienced engineers shall be employed.

Sec. 3. When a second opening is made one opening shall be set apart exclusively for purposes of ingress and egress and shall not be clogged or obstructed with machinery, pumps or currents of heated air or steam; if the opening is a shaft it shall be fitted with safe and convenient stairs at an angle of not more than sixty degrees descent and with landings at easy and convenient distances; all water coming from the surface or out of the strata in the shaft shall be conducted by rings or otherwise to be prevented from falling down the shaft so as to wet persons who are ascending and descending the stairway of the shaft; if the opening in a slope, it shall be provided with safe and available traveling-ways.

Sec. 4. The owner or agent of every bituminous coal mine, whether shaft, slope or drift, shall within six months after the passage of this act provide and thereafter maintain for every such mine ample means of ventilation, affording one hundred cubic feet per minute for each and every person employed in said mine, which shall be circulated around the main headings and cross headings to an extent that will dilute, carry off and render harmless the noxious gases generated therein; and all mines generating fire-damp shall be kept free of standing gas, and every working place shall be carefully examined every morning with a safety-lamp by a competent person before any workmen are allowed to enter.

Sec. 5. In order to better secure the proper ventilation of every coal mine and promote the health and safety of the persons employed therein, the owner or agent shall employ a competent and practical inside overseer, to be called mining boss, who shall keep a careful watch over the ventilating apparatus, the air-ways, traveling-ways, pumps and pump-timbers, and drainage; and shall see that as the miners advance their excavations all loose coal, slate and rock overhead are carefully secured against falling in or upon the traveling-ways, and that sufficient timber is furnished, of suitable lengths and sizes for the places where they are to be used, and placed in the working places of the miners; and it shall also be the duty of the mining boss to measure the current of air at least once a week, at the inlet and outlet, and at or near the face of the headings, and keep a record of such measurement, and report the same to the inspector of his district once in every month; the safety-lamps used for examining mines, or which may be used in working therein, shall be furnished by and be the property of the owner of said mines, and shall be in the charge of the agent of such mine, and in all mines generating explosive gases the doors used in assisting or directing the ventilation of the mines shall be so hung and adjusted that they will close themselves, or be supplied with springs or pulleys so that they cannot be left standing open; and bore-holes shall be kept not less than twelve feet in advance of the face of every working place, and when necessary, on the sides, if the same is driven towards and in dangerous proximity to an abandoned mine or part of a mine suspected of containing inflammable gases, or which is inundated with water.

SEC. 6. Any miners, workmen or other persons who shall intentionally injure any shaft, lamp, instrument, air-course or brattice, or obstruct or throw open air-ways, or carry lighted pipes or matches into places that are worked by safety-lamps; or handle or disturb any part of the machinery; or open a door and not close it again; or enter any place of a mine against caution; or disobey any order given in carrying out the provisions of this act; or do any other act whereby the lives or the health of persons, or the security of the mines or the machinery are endangered, shall be deemed guilty of a misdemeanor, and may be punished in the manner provided in the sixteenth section of this act. All machinery about the mines shall be properly fenced off, and the top of each shaft and the entrance of every abandoned slope and air or other shaft shall be securely fenced off; and there shall be cut in the side of every hoisting shaft at the bottom thereof a traveling-way sufficiently high and wide to enable persons to pass the shaft in going from one side of the mine to the other without passing over or under the cage or other hoisting apparatus.

SEC. 7. If any person, firm or corporation is, or hereafter shall be seized in his or their own right of coal lands, and it shall not be practicable to comply with the requirements of this act in regard to drainage and ventilation by means of openings on his or their own land, and the same can be done by means of openings on adjacent lands, he or they may apply by petition to the court of quarter sessions of the proper county, after ten days' notice to the owners, their agent or attorney, setting forth the facts under oath or affirmation particularly describing the place or places where such opening or openings can be made, and that he or they cannot agree with the owner or owners of the land as to the amount to be paid for the privilege of making such opening or openings; hereupon the said court shall appoint three disinterested and competent citizens of the county to view the grounds designated, and lay out from the point or points mentioned in such petition a passage or passages for air and water not more than sixteen feet in diameter by the shortest and most convenient route to the coal of such person, firm or corporation, preferring in all cases an opening through the coal strata where the seam is practicable; the said viewers shall at the same time assess the damages to be paid by the petitioner or petitioners to the owner or owners of such land for the privilege of making said openings, which damages shall be fully paid before such opening is made; it shall be the duty of said viewers to give notice by at least three written or printed handbills posted on the premises at least five days prior to the time of meeting to attend to the duties of their appointment, setting forth distinctly the time, place and object of their meeting, and also to give personal notice to the parties, their agents and attorneys, where it can be done, and shall, within thirty days after their appointment make report of their proceedings to said court, stating the amount of damages awarded, accompanied by a map or plan of said openings; and if no appeal be taken to said court within ten days after notice to the opposite party in interest of the filing thereof, it shall be marked confirmed by the clerk and the petitioner or petitioners may proceed to make said opening or openings; the pay of the viewers and other costs shall be the same as in road cases, and shall be paid by the petioner or petitioners.

SEC. 8. As soon as practicable after the passage of this act the persons exercising the office of presiding judge of each of the several courts of common pleas in the fifth, tenth, and fourth judicial districts shall appoint one reputable miner of known experience and in practice at the time (in the fifth district the president, judge of the court of common pleas, number one shall make said appointment), and the Governor shall appoint two mining engineers of like repute and experience and practice at the time who shall constitute a board of five examiners, whose duty it shall be to inquire into the character and qualifications of candidates for the office of inspector of mines under the provisions of this act. The examiners first appointed in pursuance of this section, shall meet in the city of Pittsburgh on the fifteenth day of May next, and after being duly organized, having taken and subscribed before any officer authorized to administer the same, the following oath namely: "We, the undersigned, do solemnly swear (or affirm) that we will perform the duties of examiners of applicants for appointment as inspector of bituminous coal mines to the best of our abilities and that in recommending or rejecting said applicants we will be governed by the evidence ot qualification to fill the position, under the law creating the same and not by any consideration of political or other personal favor; that we will certify all whom we may find qualified, according to the true intent and meaning of the act and none others to the best of our judgment; shall proceed to the examination of those who may present themselves as candidates for said office; and they shall certify to the Governor the names of all such applicants as they shall find competent to fill the office under the provisions of this act which names, with the certificate and the oath of the examiners shall be mailed to the Secretary of the Commonwealth to be filed in his office, and shall be valid when recommended by four of the examining board." The qualifications of candidates for said office of inspector of mines to be inquired into and certified by said examiners, shall be as follows; namely, They shall be citizens of the United States, of temperate habits, of good repute as men of personal integrity, shall have obtained the age of thirty years and shall have had at least five years experience in the workings of the bituminous coal mines of Pennsylvania and upon the examination they shall give evidence of such theoretical as well as practical knowledge of the working of coal mines and noxious gases as will satisfy the examiners of their capability and fitness for the performance of the duties imposed upon inspectors of mines by the provisions of this act. The board of examiners shall, also, at their said meeting, divide the bituminous coal counties of the State into three inspection districts as nearly equal in regard to the labor to be performed as is possible, taking into consideration the number of mines and the extent of territory; at every subsequent calling of the board of examiners this division may be revised as experience may prove to be advisable. The board of examiners shall each receive five dollars per day and all necessary expenses to be paid out of the State treasury upon the filing of the certificates of the examining board in the office of the Secretary of the Commonwealth, as herein before provided.

The Governor shall from the names so certified appoint one person to be inspector of mines for each district, as fixed by the examiners in pursuance of this act, whose commission shall be for four years to be computed from the fifteenth day of May next. As often as vacancies occur by death, resignation or otherwise in said offices of inspectors of mines, the Governor shall fill the same, by appointment for the unexpired term, from the names on file in the office of the Secretary of the Commonwealth, until the number shall be exhausted; and whenever this shall occur the Governor shall cause the aforesaid board of examiners to meet, who shall examine persons that may present themselves for the vacant office of inspector, in the same manner as herein provided and the board of examiners shall certify to the Governor one person to be commissioned by him for the office of inspector for the unexpired term and any vacancies that may occur in the examining board shall be filled in the district where the vacancy occurred. And every four years the Governor shall appoint two mining engineers as before and shall notify the persons exercising the office of president judge of the courts of common pleas of three of the judicial districts of the State, containing bituminous coal mines selecting them in such order as to allow each district an equal share of such appointments, each to appoint one miner-and the five so appointed shall constitute a new board of examiners whose duties, term of service, and compensation, and vacancies that may happen, shall be the same as those first provided for by this section and from the names that may be certified by them, the Governor shall appoint the inspectors provided for in this act. Nothing in this act shall be construed to prevent the reappointment of any inspector of bituminous mines. The inspectors of mines shall each receive for their services an annual salary of two thousand dollars to be paid quarterly by the State treasurer, and they shall each reside in the district for which they shall be appointed. Each inspecter is hereby authorized to procure such instruments and chemical tests and stationery, from time to time as may be necessary to the proper discharge of his duties, under this act, at the expense of the State, which shall be paid by the State treasurer, upon accounts duly certified by him and audited by the proper department of the State. All instruments, plans, book memoranda, notes, etcetera, pertaining to the office shall be the property of the State and shall be delivered to their successors in office.

SEC. 9. Each inspector of bituminous coal mines shall, before entering upon the discharge of his duties give bond in the sum of five thousand dollars with sureties to be approved by the president judge of the district in which he resides, conditioned for the faithful discharge of his duty, and take an oath (or affirmation) to discharge his duties impartially and with fidelity to the best of his knowledge and ability.

SEC. 10. No person who shall act as a manager or agent of any coal mine or as a mining engineer or to be interested in operating any coal mine shall at the same time act as an inspector of coal mines under this act.

SEC. 11. For any injury to person or property occasioned by any violation of this act or any willful failure to comply with its provisions by any owner, lessee, or operator of any coal mine or opening, a right of action against the party at fault shall accrue to the party injured for the direct damages sustained thereby; and in any case of loss of life by reason of such violation or willful failure a right of action against the party at fault shall accrue to the widow and lineal heirs of the person whose life shall be lost, for like recovery of damages for the injury they shall have sustained.

SEC. 12. The inspectors of bituminous coal mines shall each devote the whole of his time to the duties of his office; it shall be his duty to examine the mines in his district as often as possible to see that all the provisions of this act are observed and strictly carried out, and he shall make a record of all examinations of mines showing the condition in which he finds them, the number of mines in his district, the number of persons employed in and about each mine, the extent to which the law is obeyed, the progress made in the improvement sought to be secured by the passage of this act, the number of accidents and deaths resulting from injuries received in the mines and all other facts of public interest concerning the condition and progress of mining in his district, which record shall on or before the first Monday of each month together with all matters and things furnished him in accordance with the provisions of this act be filed in the office of the Secretary of Internal Affairs to be by him recorded and included in the annual report of his department; he shall also from the time of his commission make strict and careful inquiry and examination into the condition of the ventilation and drainage of the mines.

SEC. 13. That the inspectors may be enabled to perform the duties herein imposed upon them, they shall have the right at all times to enter any bituminous coal mine to make examination or obtain information; they shall notify the owners, lessee or agents immediately of the discovery of any violations of this act and of the penalty imposed thereby for such violations, and in case of such notice being disregarded for the space of ten days they shall institute a prosecution against the owner, owners, agent or lessee of the mine under the provisions of section sixteen of this act, in any case, however where in the judgment of the inspector of either district delay may jeopordize life or limb he shall at once notify the inspectors of the other districts whereupon they shall at once proceed to the mine or colliery where the danger exists; and examine into the matter and if after full investigation thereof they shall be agreed in the opinion that there is immediate danger they shall apply in the name of the Commonwealth to the court of common pleas of the county in which the mine may be located for an injunction to suspend all work in and about such mine or colliery; whereupon said court if the cause appear to be sufficient after hearing the parties and their evidence as in like cases shall issue their writ to restrain the working of said mine or colliery until all cause of danger is removed; and the costs of said proceedings including the charges of attorney prosecuting said application shall be borne by the owner of the mine or colliery: *Provided*, That no fee exceding the sum of twenty-five dollars shall be taxed in any one case for the attorney prosecuting such case: *Provided*, Further, that if said court shall find the cause not sufficient then the case shall be dismissed and the costs shall be borne by the inspector instituting the proceeding or the county, in the discretion of the court.

SEC. 14. Whenever by reason of any explosion or other accident in any bituminous coal mine or the machinery connected therewith, loss of life or serious personal injury shall occur it shall be the duty of the person having charge of such mine or colliery to give notice thereof forthwith to the inspector of the district, and if any person is killed, thereby to the coronor of the county, who shall give due notice of the inquest to be held; it shall be the duty of the inspector upon being notified as herein provided, to immediately repair to the scene of the accident and make such suggestions as may appear necessary to secure the future safety of the men; and if the results of the explosion do not require an investigation by the coroner, he shall proceed to investigate and ascertain the cause of the explosion or accident and make a record thereof which he shall file as provided for; and to enable him to make the investigation he shall have power to compel the attendance of persons to testify, and administer oaths or affirmations; the costs of such investigation shall be paid by the county in which the accident occurred, in the same manner as costs of inquests held by the coroners or justices of the peace are paid

SEC. 15. The court of common pleas of any county in the proper district upon a petition signed by not less than fifteen reputable citizens, not less than five of whom shall be miners, owners, or lessees of mines ,and with the affidavit of one or more of said petitioners attached setting forth that any inspector of mines neglects his duties or is incompetent or that he is guilty of malfeasance in office, shall issue a citation in the name of the Commonwealth to the said inspector to appear on not less than fifteen days' notice upon a day fixed before said court at which time the court shall proceed to inquire into and investigate the allegations of the petitioners; if the court find that the said inspector is neglectful of his duties or is incompetent to perform the duties of his office or that he is guilty of malfeasance in office the court shall certify the same to the Governor who shall declare the office of said inspector vacant and proceed in compliance with the provisions of this act to supply the vacancy; the cost of said investigation shall if the charges are sustained be imposed upon the inspector, but if the charges are not sustained they shall be imposed upon the petitioners.

SEC. 16. The neglect or refusal to perform the duties required to be performed by any section of this act by the parties therein required to perform them or the violation of any of the provisions or requirements hereof shall be deemed a misdemeanor and shall upon conviction be punished by fine of not less than two hundred dollars nor not exceeding five hundred dollars at the discretion of the court; and all penalties recovered under this act shall be paid into the treasury of the State.

SEC. 17. The inspector shall exercise a sound discretion in the enforcement of the provisions of this act and should the operator or owner be dissatisfied with any decision at which the inspector may arrive, it shall and may be lawful for such operator or owner to apply by petition to the court of quarter sessions of the county wherein such mine is located and said court shall thereupon appoint three reputable, competent and disinterested persons whose duty it shall be to forthwith examine such mines and hear the proofs and allegations of the inspectors and operators or owner, and make such report under oath, to court, of the facts as they exist together with their opinion thereon; and if said report sustains the decisions of the inspector then the party making application to court shall pay the cost of such proceedings, and if the report is against such decision then the inspector shall pay the costs unless the court order otherwise. The report of said board shall become absolute, unless exceptions thereto shall be filed within ten days after notice of the filing thereof to the owner, operator or inspector, and if exceptions are filed the court shall hear and determine the same and the decision shall be final and conclusive.

SEC. 18. The provisions of this act shall not apply to any mine where ten men or a less number are employed or to any mine which does not generate fire-damp, black-damp, or other dangerous or noxious gases.

SEC. 19. All laws or parts of laws, inconsistent with any of the provisions of this act, are hereby repealed.

AN ACT to amend an act, entitled, "an act to provide the means for securing the health and safety of persons employed in the bituminous coal mines of Pennsylvania."

SECTION 1. *Be it enacted, etc*: That the last clause of the eighteenth section of the act of the General Assembly, entitled: "An act to provide the means for securing the health and safety of persons employed in the bituminous coal mines of Pennsylvania," approved the eighteenth day of April, Anno Domini one thousand eight hundred and seventy-seven. After the word "employed," in the second line of said section, which is as follows: "Or to any mine which does not generate fire-damp, black-damp, or other dangerous or noxious gases," is hereby repealed.

ABSTRACT OF BRITISH MINING LAW.

The following is copied from the last annual report of the State Mine Inspector of Ohio.

Application of Act—Inspectors—Managers—Restrictions as to Employment Under Ground—Restrictions as to Employment Above Ground—Who may be Employed about an Engine—Penalty for Misrepresentation of Age—Wages not to be paid in Public Houses—Weighing—Prohibition of Single Shafts—Fencing Abandoned Mines—General Rules—Special Rules—Dangerous Practices not Expressly Prohibited—Penalties—Misscellaneous—Register, Returns, Plans, Abandonment of Mines, Notices, Coroners' Inquests—Exemptions—Thin-Seam Mine, Saturday Half-Holiday, Ireland, Weighing Provisions, Single Shafts—General Rules.

1. The act applies to coal mines, mines of stratafied ironstone, mines of shale, mines of fire-clay.

Definition of mine.—The term "mine" includes every shaft in the course of being sunk, and every level and inclined plane in the course of being driven, for commencing or opening any mine, or for searching for, or proving minerals, and all the shafts, levels, planes, machinery, tramways, and sidings, both below ground and above ground, in and adjacent to a mine, and any such shaft, level, and inclined plane, and belonging to the mine. The term "shaft" includes pit. Where two or more parts of a mine are worked separately, each of such parts may, after notice, be constituted a separate mine for the purpose of the act. A secretary of State, however, may object thereto, and the owner or agent must acquiesce in such objection, or refer the matter to arbitration.

3. The commencement of the act is, for England and Scotland, 1st January, 1873; for Ireland, 1st January, 1874.

4. Inspectors of mines are to be appointed by a secretary of State, and a district to be assigned to each. The existing inspectors are to continue to act.

5. An inspector may not himself be, or practice, or be the partner of one who is or who practices, as land agent or mining engineer, or as a manager, viewer, agent or valuer of mines, or as arbitrator, in mining cases, and may not be otherwise employed in or about any mine, whether such mine is one to which the act applies or not.

6. In order to ascertain whether the provisions of the act are observed both above ground and below ground, the inspector is authorized to examine any mine by day or by night, so, however, as not to impede the working thereof; and owners, agents, and managers, and all employed in or about the mine, are bound to render him every assistance in conducting such examination.

7. He is to make to a secretary of State an annual report of his proceedings, to be laid before Parliament, and, when directed, is to make a special report as to any mine accident attended with loss of life or personal injury. Such special report will be made public in the mode, and at the time directed by a secretary of State.

8. *Rule.*—Subject to the exceptions mentioned below, every mine must be under the control and daily supervision of a certificated manager.

9. *Exception 1.*—The rule requiring a manager does not apply to any mine in which less than thirty persons are ordinarily employed below ground, unless the inspector of the district insists upon it.

10. *Exception 2*—The rule requiring a manager does not apply to any mine, the average daily output of which does not exceed twenty-five tons, unless the inspector of the district insists upon it.

11. *Exception 3.*—In special circumstances, notified to the inspector of the district, a manager may be temporarily dispensed with.

12. The certificate, given by a secretary of State, is either a certificate of service, given only to persons who before the 10th of August, 1872, were acting, and have since then acted, in the capacity of manager of mine, or who since the 10th of August, 1867, have acted in a like capacity for more than twelve months; or a certificate of competency given after examination, and upon proof of sobriety, experience, ability and general good conduct. The examination is conducted by examiners appointed by a district board, and the members of such district board are appointed by the Secretary of

State, and consists of three owners, agents or managers of a mine within the district; three persons employed in or about a mine within the district, not being owners, agents, or managers; three mining engineers, agents, managers, or coal viewers within the district, and an inspector of mines. The area of the district is fixed by a secretary of State.

13. The owner or agent may nominate either himself or any other person as manager, but the manager must not be a contractor for getting the mineral, or in the employ of a contractor.

14. A secretary of State, on a representation made that a certificated manager is by reason of incompetency or gross negligence, unfit to discharge his duties, or has been convicted for an offense against the act, may order a court of inquiry to be held, and, on the report of the court, cancel or suspend the certificate. He may also restore a certificate canceled or suspended.

15. A register of certificated managers is kept under the directions of a secretary of State.

16. Women and girls of any age may not be employed at all.

17. Boys under 12 may not be employed at all, unless the mine is specially exempted by the Secretary of State by reason of the thinness of the seam; when subject to certain conditions, stated in the exemption, boys between 10 and 12 may be employed.

18. Boys of 12 and under 13, and male young persons of 13 and under 16 may be employed not more than 54 hours a week, or more than 10 hours a day, and are to be allowed an interval of 12 hours for rest between each two consecutive periods of employment except between Friday and Saturday, when an interval of 8 hours will suffice.

19. A week begins at 12 P. M. on Saturday and ends 12 P. M. the Saturday following.

20. A period of a person's employment begins at the time of his leaving the surface, and ends at the time of his returning to the surface.

21. The immediate employer of any boy of 12 and under 13, and of any male young person of 13 and under 16, is not to take him below ground until he has reported his intention so to do to the manager, or to some person appointed by the manager.

22. Children under 10, of either sex, may not be employed at all.

23. Children of 10 and under 13, of either sex, may be employed, but not for more than 6 days a week, and not for more than 6 hours a day if employed for more than 3 days in a week, and not for more than 10 hours a day if employed for only 3 days, or less than 3 days in a week.

24. For children so employed an interval of 12 hours for rest must be allowed between two consecutive periods of employment, except between Friday and Saturday, when an interval of 8 hours will suffice.

25. *Schooling.*—The parent or guardian of, or person having the custody or control of any child so employed, must see that the child attends school (except in the case of there being no school which the child can attend within two miles of his or her home, or of the mine). Such attendance must be for at least 20 hours in every 2 consecutive weeks of employment, and any attendance is not to count if it is in excess of 3 hours at a time, or 5 hours in a day, or of 12 hours in a week, or on Sundays, or before 8 A. M., or after 6 P. M.

26. It will be the duty of the immediate employer, after employing a child for a fortnight, to obtain from the teacher every Monday morning during the continuance of the employment a certificate of the child's attendance at the school during the preceding week, and to deliver the certificate to the owner, agent or manager, who must keep the same in the office at the mine for six months for production to the inspector.

27. Also the person who pays the child's wages must, after a single application of the teacher, pay regularly every week the cost of the child's schooling (not to exceed 2d. a week, or one-twelfth of the child's wages), and he may deduct from the child's wages any sum so paid.

28. A teacher who is unfit, or who misconducts himself, is liable to be disqualified by an inspector of mines, for granting certificates of attendance, subject to an appeal to the educational department.

29. Young persons of 13 and under 16, of either sex, and women above 13, may not be employed more than 54 hours a week, or more than 10 hours a day, and must be allowed an interval of 12 hours for rest between two consecutive periods of employment, except between Friday and Saturday, when an interval of 8 hours will suffice.

30. Children of 10 and under 13, of either sex; young persons of 13 and under 16, of either sex, and women above 13, may not be employed between 9 P. M. and 5 A. M., or on Sundays, or after 2 P. M. on Saturdays; also they are to be allowed intervals for meals; namely, half an hour during a period of employment which exceeds 5 hours; one and a half hours during a period of employment which exceeds 8 hours. A mine in Ireland may be exempted by the Secretary of State from the provisions as to the Saturday half-holiday. (See exemption set forth below, paragraph 72.)

31. The person who is in charge of any engine, windlass or gin, howsoever worked, which is used for the purpose of taking persons up or down or along any shaft, inclined plane or level, (being either an entrance to a mine or a communication from one part of a mine to another), or who is in charge of any part of the tackle of such engine, windlass or gin, must be a male at least 18 years of age. If the engine, windlass or gin is worked by an animal, then, not the driver, but the person under whose direction the driver acts, is to be deemed the person in charge, but in that case the driver must not be under 12 years of age.

32. Any parent or guardian misrepresenting the age of any person with a view to procuring him employment in contravention of the act will be liable to punishment.

33. *Not to be paid in Public House, etc.*—Wages are not to be paid on any premises used for the sale of intoxicating liquor, or in any place contiguous to such premises.

34. Payment by day on yardage is allowed, but in any mine, unless expressly exempted, (see below, paragraph No. 73), where the amount of wages depends on the amount of mineral gotten, wages are to be paid according to the standard weight in pounds avoirdupois of the mineral gotten.

35. The weighing-machines and weights are subject to the inspection of the Inspector of Weights and Measures.

36. *Check-weigher.*—The persons employed in a mine may if they think proper, appoint a check-weigher at their own cost. The check-weigher must be a person employed either in the same mine, or in another mine belonging to the same owner. He is entitled to have every facility afforded to him to take a correct account of the weighing, but he is not to impede the working of the mine, or interfere with the weighing; and in his absence, the weighing may be carried on without him. He is liable to be removed by the magistrate for misconduct, and in that case, another may be selected to fill his place.

37. The weighing provisions expressly sanction agreements to be made between the employers and employed for deductions on account of "dirt" or "shorts," the words of the act being, "Nothing herein contained shall preclude the owner, agent or manager of the mine from agreeing with persons employed in such mine that deductions shall be made in respect of stones or materials other than mineral contracted to be gotten, which shall be sent up from the mine with mineral contracted to be gotten; or in respect of any tubs, baskets, or hatches being improperly filled, in those cases which they are filled by the getter of the mineral, or his drawer, or by a person immediately employed by him." Such deductions are to be determined by the banks-man, or weigher and check-weigher, or, in the event of difference, by a third person, to be mutually agreed on between the owner, agent, or manager, on one hand, and the persons employed in the mine, on the other.

38. *Rule.*—Subject to the exceptions stated below, and to any exemptions specially granted, every mine must have two shafts or two outlets in communication with every seam in work, which are capable of affording distinct means of ingress and egress to the persons employed in the seam. These shafts need not belong to the same mine. They must be separated by natural strata of not less than 10 feet in breadth, though openings may be made through the strata for such purposes as ventilation and drainage. Such openings, however, must, in the case of mines where inflammable gas has been found within the preceding 12 months, be only temporary. Between the two shafts or outlets there must be a communication

not less than 4 feet wide and 3 feet high. At each of the shafts or outlets, or on the works belonging to the mine, there must be kept, for raising or lowering persons, proper apparatus in actual use, or available for use within a reasonable time.

39. *Exception No. 1.*—The rule does not apply in case of a new mine being opened for the purpose of searching for or proving minerals, so long as not more than 20 persons are employed below ground at any one time in the whole of the different seams in connection with the shaft.

40. *Exception No. 2.*—The rule does not apply to any working for the purpose of making communication between two or more shafts so long as not more than 20 persons are employed below ground at any one time in the whole of the different seams in connection with each shaft or outlet.

41. *Exception No. 3.*—The rule does not, in the case of mines which before the passing of the act were not required to have a double shaft, come into operation till the first of January, 1875.

42. In certain cases temporary or permanent exemptions are allowed. (See below, paragraph 74).

43. Where a mine is abandoned, or the working thereof discontinued (at whatever time such abandonment or discontinuance occurred), the top of the shaft and any side entrance from the surface must be kept securely fenced by the owner of the mine or the persons interested in the minerals thereof.

44. The act prescribes general rules (set forth at length hereunder, paragraph 70), which are to be observed so far as is reasonably practicable, in every mine.

45. In addition to the general rules, but not at variance with them, each mine must have its own set of special rules, framed to meet the special circumstances of the mine.

46. *Object.*—The object of special rules is to prevent dangerous accidents, and to provide for the proper discipline of those employed in the mine.

47. *Force.*—Special rules have the same force as if they were contained in the act.

48. *How made.*—Special rules are prepared in the first instance on behalf of the owner, and are, together with a notice, to be posted up during a fortnight on the premises; such notice to be printed, and to be to the effect that at the end of the fortnight the rules will be submitted to the inspector of mines for the district, and that in the meantime any person employed in the mine is entitled to forward any objection to the inspector at his address, as stated in the notice. On the expiration of the fortnight they are to be signed by the owner, agent or manager, and transmitted to the inspector, together with a certificate that the rules and the notice have been posted up as aforesaid.

49. A secretary of state, may within 40 days, object to the special rules if they are insufficient or unreasonable, and require

them to be modified. These requisitions must be complied with or else referred to arbitration.

50. After 40 days, special rules, if not objected to, become established, and are to be signed by the inspector of the district.

51. *At what time to be made.*—In mines having special rules in operation on the 1st of January, 1873, proper steps must be taken before the 1st of April, 1873, to submit a new set of special rules to the inspector. Meantime the existing special rules will continue in force. In the case of a new mine being opened, or the working of an old mine being renewed, the act allows three months within which special rules may be submitted.

52. *Amendment.*—At any time special rules may be amended in like manner at the instance of the owner, agent or manager. Also the Secretary of State may at any time propose amendments, which must be complied with, or referred to arbitration.

53. *Publication.*—A copy at full length of the special rules when made, and also of this abstract, together with the name and address of the inspector of the district, and the name and address of the owner, or agent, or manager of the mine must be kept posted up on the premises, and a copy thereof supplied gratis on application.

54. Any person who pulls down documents so posted up is liable to punishment.

55. If in any respect a mine is carried on in a manner which, though not expressly forbidden by the terms of this act, or by special rules, is, nevertheless, dangerous, the inspector may require the matter to be remedied, and the owner, agent or manager is bound to comply with the requisition, or else submit to a reference to arbitration.

56. Breach of a general rule by any person, or a special rule by any person bound to observe the same, is an offense against the act. And in the event of such an offense being proved to have been committed, the owner, agent, and manager will also each of them be guilty of an offense against the act, unless he proves that he had taken all reasonable means to prevent the offense by publishing, and, to the best of his knowledge, enforcing rules. A like liability arises with respect to other provisions of the act, the breach of which is declared an offense against the act.

57. The penalty for an offense against the act (except when another penalty expressly specified) is if the offense be committed by a person employed in or about the mine not exceeding £2; if committed by the owner, agent or manager, not exceeding £20, and a further penalty not exceeding £1 per day for every day that such offense continues to be committed, after a written notice from the inspector.

58. Where, however, the court is of the opinion that the offense is one which is reasonably calculated to endanger the safety of those employed in or about the mine, or to cause serious personal injury or dangerous accident, and was committed willfully by the personal act, personal default, or personal negligence of the accused, and that

pecuniary penalty will not meet the circumstances of the case, the punishment may be imprisonment, with or without hard labor, for three months.

59. An appeal lies in case of imprisonment, or half the maximum penalty has been adjudged.

60. An offense can only be prosecuted within three months after the date when it is committed.

61. An offense by an owner, agent, or manager cannot be summarily prosecuted, except either by an inspector of mines or with the consent of the secretary of state.

62. The owner, agent, or manager may be sworn and examined as an ordinary witness, if charged in respect of any contravention or non-compliance by another person.

63. Penalties for neglecting to send notices of accident, or for any offense against the act which has occasioned loss of life or personal injury, may be directed by a secretary of state to be paid to the sufferers, or to relatives of deceased sufferers, but not to any person who has contributed to the neglect or offense.

64. A person who is the owner, agent, or manager of any mine in which the coal mines regulation act applies, or the father, son, or brother of such owner, agent, or manager, is disqualified from summarily adjudicating on any offense committed against the act.

65. *Register.*—The owner, agent, or manager, must keep in the office at the mine a register containing particulars prescribed by section thirteen as to all persons whose hours of employment are regulated by the act; and, also a memorandum of the certificates of school attendance. The register is to be produced to the inspector who may inspect or copy it.

66. Returns are to be sent annually by the owner, agent, or manager of each mine to the inspector of the district, namely: On January 1st, a return in the form of schedule four to the act, and on or before February 1st, a return, in form to be prescribed by a secretary of State, specifying the particulars mentioned in section thirty-eight of the act.

67. *Plans.*—The owner, agent, or manager is to keep in the office, at the mine, an accurate plan and section, or tracing thereof, showing the workings up to at least six months previously, and is to produce it to the inspector of mines to examine, but not to copy; and, if requested, is to mark on the plan the workings up to production.

68. *Plans and Abandonment.*—Within three months of the abandonment of a mine, a plan and section, or tracing thereof, showing the boundaries of the workings, are to be sent by the owner to the Secretary of State, as a mining record, not, however, to be seen, until after the lapse of ten years, except by an inspector, or by consent.

69. Notices must be sent by the owner, agent, or manager of a mine to the inspector of mines for the district, as follows: Of the appointment of a manager, together with his name and address,

immediately after his appointment; and in case of the temporary appointment of an uncertificated manager, the notice shall state the reason for such appointment; of any accident causing loss of life, or serious personal injury, within 24 hours after such accident; of any accident from explosion of gas, powder, or steam boiler, causing any personal injury, within 24 hours after such accident; of any death resulting from personal injury, caused by an accident previously reported, within 24 hours after the death comes to the knowledge of the owner, agent, or manager. The following is to be made within two months after the event to be notified: Of the commencement of any working for the opening of a new shaft; of the abandonment of a shaft; of the recommencement of the working of a shaft after an abandonment of more than two months; of any change in the name of the mine, or in the name of the owner, agent, or manager; of any change in the officers of any incorporated company owning a mine. Notice must also be given by the owner or agent (not by the manager), of the fact that two or more parts of a mine are worked separately, with a view that each may be deemed to constitute a separate mine for the purposes of the act.

70. *Coroner's Inquests.*—In the case of an inquest being held concerning a death being caused by a mine accident, unless the inspector or some other person on behalf of a secretary of State is present, the coroner is to adjourn the inquest, and to send to the inspector four days' notice of the time and place of the adjourned inquest. If, however, only one life has been lost, by the accident, and forty-eight hours' notice of time and place of holding the inquest has been sent to the inspector, the inquest need not be adjourned if a majority of the jury think it unnecessary. At the inquest the inspector of mines may examine any witness subject to the order of the coroner. If the inspector is not present, and evidence is given of any neglect having caused or contributed to the accident, or of any defect in or about the mine appearing to require a remedy, the coroner is to send to the inspector notice thereof in writing. In the event of a fatal accident occurring in a mine and an inquest being held, no person who is employed in that mine, or is concerned in its management or has a personal interest in that mine, is qualified to serve on the jury.

71. *Employment of Boys in Thin Seam Mines.*—A secretary of State may exempt a thin seam mine from the provisions (see above paragraph No. 17) prohibiting employment, below ground, of boys under twelve. In a mine so exempted, boys of ten and under twelve may be employed under ground, but not for more than six days a week; not for more than six hours a day, if employed for more than three days in a week; not for more than ten hours a day, if employed for only three days or for less than three days in a week. An interval of twelve hours rest shall be allowed between each two consecutive periods of employment, except between Friday and Saturday, when an interval of eight hours will suffice. The period of such employment of a boy is deemed to begin at the time of his

leaving the surface and to end at the time of his return to the surface. The week is deemed to begin at 12 p. m., Saturday, and to end at 12 p. m. on the Saturday following. The immediate employer of any boy of ten and under twelve is not to take him below ground until he has reported his intention so to do to the manager or to some person appointed by the manager; boys of ten and under twelve are subject to the same provisions with regard to schooling as are prescribed (see above paragraphs 25, 26, 27, 28,) for children under thirteen employed above ground.

72. *Saturday Half-holiday—Ireland.*—A secretary of State may exempt any mine in Ireland from the provisions (see above paragraph 30) prohibiting the employment below ground of women, young persons or children, after 2 o'clock on Saturday afternoon.

73. *Weighing Provisions.*—A secretary of State may grant exemption from the weighing provisions (see above paragraph 34) or postpone their operation with respect to any mine or class of mines, as to which he is satisfied that such exemption or postponement is requisite or expedient by reason of the exigencies of the case. In any mine so exempted, wages may be paid according to measure or gauge, and local measures and gauges may be adopted, subject, however, to inspection by the inspectors of weights and measures. A check-measurer may be appointed in like manner as a check-weigher.

74. *Single Shafts.*—A Secretary of State may exempt a proved mine from the provisions (see above paragraph 42) prohibiting single shafts if satisfied that the quantity of mineral proved is insufficient to repay the outlay of the sinking or making of a second shaft or outlet. In a mine so exempted, there must not be employed below ground at any one time in the whole of the different seams in connection with the shaft or outlet, more than twenty persons; or, if the mine is not a coal mine or mine with inflammable gas, more than such other large number as a secretary of State may allow. If the mine is not a coal mine or mine with inflammable gas and the Secretary of State is satisfied that sufficient provision has been made against danger from other causes than explosion of gas by using stone, brick or iron, in the place of wood in the lining of the shaft and construction of the side-wall; in a mine so exempted there must not be employed below ground at any one time, in the whole of the different seams in connection with the shaft or outlet, more than the number of persons the Secretary of State may allow. If satisfied that the workings of a seam have reached the boundary of the property, or the extremity of the mineral field, and that it is expedient to work away the pillars already formed in the course of the ordinary workings, notwithstanding that by so working away the pillars one of the shafts or outlets may be cut off. In a mine so exempted there must not be employed below ground at any one time, in the whole of the different seams in connection with the shaft or outlet, more than twenty persons; or if the mine is not a coal mine or a mine with inflammable gas, more than such larger number as

the Secretary of State may allow, if satisfied by reason of an accident one of the shafts or outlets has become unavailable for the use of the persons employed in the mine; a mine so exempted may only be worked subject to the conditions specified in the exemption. In the case of a mine not at the time of passing the act required to have two outlets provided that an application is made in England or Scotland within six months after the first of January, 1873, or in Ireland within six months after the first of January, 1874, and the Secretary of State is satisfied that the mine is nearly exhausted; if the Secretary of State refuse to grant such exemption the matter may be referred to arbitration.

75. Also in the case of a mine not at the time of the passing of the act required to have two outlets, a secretary of State may grant an extention of time (see above paragraph 41) for providing an additional shaft or outlet if an application is made to him within six months preceding the first of January, 1875. In the event of the Secretary of State refusing such extension of time, the matter may be referred to arbitration.

76. The following are the general rules: An adequate amount of ventilation shall be constantly produced in every mine to dilute and render harmless noxious gases to such an extent that the working places of the shafts, levels, stables and workings of such mine, and the traveling roads to and from such working places, shall be in a fit state for working and passing therein. In every mine in which inflammablegas has been found within the preceding twelve months, then once in every twenty-four hours if one shift of workmen is employed, and once in every twelve hours if two shifts are employed; during any twenty-four hours, a competent person or competent persons who shall be appointed for the purpose, shall, before the time for commencing work in any part of the mine, inspect with a safety-lamp that part of the mine, and the roadways leading thereto, and shall make a true report of the condition thereof so far as ventilation is concerned, and a workman shall not go to work in such part until the same and the roadways leading thereto are stated to be safe. Every such report shall be recorded without delay in a book which shall be kept at the mine for the purpose, and shall be signed by the person making the same. In every mine in which inflammable gas has not been found within the preceding twelve months, then once in twenty-four hours a competent person or competent persons who shall be appointed for the purpose, shall, so far as is reasonably practicable, immediately before the time for commencing work in any part of the mine, inspect that part of the mine, and the roadways leading thereto, and shall make a true report of the condition thereof so far as ventilation is concerned, and a workman shall not go to work in such part until the same and the roadways leading thereto are stated to be safe. Every such report shall be recorded without delay in a book which shall be kept at the mine for the purpose, and shall be signed by the person making the same.

All entrances to any place not in actual course of working and extension shall be properly fenced across the whole width of such entrance, so as to prevent persons inadvertently entering the same. A station or stations shall be appointed at the entrance to the mine, or to different parts of the mine as the case may require, and a workman shall not pass beyond any such station until the mine or part of the mine beyond the same has been inspected and stated to be safe.

If, at any time, it is found by the person for the time being in charge of the mine or any part thereof, that by reason of noxious gases prevailing in such mine or such part thereof, or of any cause whatever, the mine or the said part is dangerous, every workman shall be withdrawn from the mine or such part thereof as is so found dangerous, and a competent person, who shall be appointed for the purpose, shall inspect the mine or such part thereof as is so found dangerous, and if the danger arises from inflammable gas shall inspect the same with a locked safety-lamp, and in every case shall make a true report of the condition of such mine or part thereof, and a workman shall not, except in so far as is necessary for inquiring into the cause of danger, or for the removal thereof, or for exploration, be readmitted into the mine, or such part thereof as was found dangerous, until the same is stated by such report not to be dangerous. Every such report shall be recorded in a book which shall be kept at the mine for the purpose, and shall be signed by the person making the same. In every working, approaching any place where there is likely to be an accumulation of explosive gas, no lamp or light other than a locked safety-lamp shall be allowed or used; and whenever safety-lamps are required by the act, or by the special rules made in pursuance of the act, to be used, a competent person, who shall be appointed for the purpose, shall examine every safety-lamp immediately before it is taken into the workings for use, and ascertain it to be secure and securely locked, and in any part of a mine in which safety-lamps are so required to be used, they shall not be used until they have been so examined and found secure and securely locked and shall not, without due authority, be unlocked, and in the said part of a mine a person shall not, unless he is appointed for the purpose, have in his possession any key or contrivance for opening the lock of any such safety-lamp, or any lucifer-match or apparatus of any kind for striking a light.

Gunpowder, or other explosives or inflammable substance, shall only be used in the mine under ground, as follows: It shall not be stored in the mine; it shall not be taken into the mine, except in a case or canister, containing not more than four pounds; a workman shall not have in use, at one time in any one place, more than one of such cases or canisters; in charging holes for blasting, an iron or steel picker shall not be used, and a person shall not have in his possession, in the mine under ground, any iron or steel picker; and an iron or steel tamping rod or stemmer shall not be used for ramming either the wadding or the first part of the tamping or stemming on the powder; a charge of powder which has missed fire shall not be unrammed; it shall not be taken into or be in possession of any person in any mine, except in cartridges, and shall not be used, except in accordance with the following regulations, during three months after any inflammable gas has been found in any such mine, namely: A competent person who shall be appointed for the purpose, shall immediately before firing a shot, examine the place where it is to be used, and the places contiguous thereto, and shall not allow the shot to be fired unless he finds it safe to do so; and a shot shall not be fired except by or under the direction of a competent person, who shall be appointed for the purpose. If the said inflammable gas issues so freely that it shows a blue cap on the flame of the safety-lamp, it shall only be used either in those cases of stone-drifts, stone-work and sinking of shafts, in which the ventilation is so managed that the return air from the place where the powder is used passes into the main air-course without passing any place in actual course of working, or when the persons ordinarily employed in the mine are out of the mine or out of the part of the mine where it is used.

Where a mine is divided into separate panels, in such manner that each panel has independent intake and return air-way from the main air-course and the main return air-course, the provisions of this rule, with respect to gunpowder or other explosive, inflammable substance, shall apply to each such panel in like manner as if it were a separate mine. Where a place is likely to contain a dangerous accumulation of water, the working approaching such place shall not exceed eight feet in width, and there shall be constantly kept, at a sufficient distance, not being less than five yards in advance, at least one bore-hole near the center of the working, and sufficient flank bore-holes on each side. Every underground plane on which persons travel, which is self-acting or worked by an engine, windlass or gin, shall be provided (if exceeding thirty yards in length) with some proper means of signaling between the stopping-places and the ends of the plane and shall be provided in every case at intervals of not more than twenty yards, with sufficient man-holes for places of refuge.

Every road on which persons travel under ground where the load is drawn by a horse or other animal shall be provided, at intervals of not more than fifty yards, with sufficient man-holes, or with a space for a place of refuge, which space shall be of sufficient length and at least three feet in width. between the wagons running on the train-road and the side of such road.

Every man-hole and a space for a place of refuge, shall be constantly kept clear, and no person shall place anything in a man-hole or such space to prevent access thereto.

The top of every shaft which for the time being is out of use, or used only as an air-shaft, shall be securely fenced.

The top and all entrances between the top and bottom of every working or pumping-shaft shall be properly fenced, but this shall not be taken to forbid the temporary removal of the fence for the purpose of repairs or other operations if proper precautions are used. Where the natural strata are not safe every working or pumping-shaft shall be securely cased, lined or otherwise made secure.

The roof and side of every traveling-road and working place shall be made secure, and a person shall not, unless appointed for the purpose of exploring or repairing, travel, or work in any such traveling-road or working place which is not so made secure.

Where there is a downcast and furnace-shaft and both such shafts are provided with apparatus in use for raising and lowering persons every person employed in the mine shall upon giving reasonable notice have the option of using the downcast-shaft.

In any mine which is usually entered by means of machinery, a competent person of such age as prescribed by the act, shall be appointed for the purpose of working the machinery which is employed in lowering and raising persons therein, and shall attend for the said purpose during the whole time that any person is below ground in the mine.

Every working-shaft used for the purpose of drawing minerals or for lowering or raising of persons, shall, if exceeding fifty yards in depth and not exempted in writing by the inspector of the district, be provided with guides and some proper means of communicating distinct and definite signals from the bottom of a shaft and from every entrance for the time being in work, between the surface and the bottom of the shaft, to the surface, and from the surface to the bottom of the shaft and to every entrance for the time being in work between the surface and the bottom of the shaft.

A sufficient cover overhead shall be used when lowering or raising persons, in every working-shaft, except where it is worked by a windlass, or where the person is employed about the pump or some work of repair in the shaft, or where a written exemption is given by the inspector of the district.

A single-linked chain shall not be used for lowering or raising persons in any working-shaft or plane, except for the short coupling chain attached to the cage or load.

There shall be on the drum of every machine used for lowering or raising persons, such flanges or horns, and also, if the drum is conical, such other appliances, as may be sufficient to prevent the rope from slipping.

There shall be attached to every machine worked by steam, water, or mechanical power, and used for lowering or raising persons, an adequate brake, and also a proper indicator (in addition to any mark on the rope) which shows to the person who works the machine the position of the cage or load in the shaft.

Every fly-wheel and all exposed and dangerous parts of the machinery used in or about the mine, shall be, and be kept, securely fenced.

Every steam boiler shall be provided with a proper steam-gauge and water-gauge, to show respectively the pressure of steam and the height of water in the boiler, and with a proper safety-valve.

After dangerous gas has been found in any mine, a barometer and thermometer shall be placed above ground in a conspicuous position near the entrance of the mine.

No person shall willfully damage, or without proper authority remove or render useless any fence, fencing, casing, lining, guide, means of signaling, signal, cover, chain, flange, horn, break, indicator, steam-gauge, water-gauge, safety-valve, or other appliances or thing provided in any mine in compliance with the act.

Every person shall observe such directions with respect to working as may be given to him with a view to comply with the act or the special rules. A competent person or competent persons, who shall be appointed for the purpose, shall once at least in every twenty-four hours examine the state of the external parts of the machinery, and the state of the head-gear, working places, levels, planes, ropes, chains, and other works of the mine which are in actual use, and once at least in every week shall examine into the state of the shafts by which persons ascend or descend, and the guides or conductors therein, and shall make a true report of the result of such examination, and such report shall be recorded in a book to be kept at the mines for the purpose, and shall be signed by the person who made the same.

The persons employed in a mine may from time to time appoint two of their number to inspect the mine at their own cost, and the persons so appointed shall be allowed, once at least in every month, accompanied, if the owner, agent or manager of the mine thinks fit, by himself or one or more officers of the mine, to go to every part of the mine, and to inspect the shafts, levels, planes, working places, return airways, ventilating apparatus, old workings and machinery, and shall be afforded by the owner, agent and manager, and all persons in the mine, every facility for the purpose of such inspection, and shall make a true report of the result of such inspection, and such reports shall be recorded in a book to be kept at the mine for the purpose, and shall be signed by the person who made the same.

The books mentioned in the General Rules, or a copy thereof shall be kept at the office of the mine, and any inspector, under the act, and any person employed in the mine, may at all reasonable times inspect and take copies of, and extracts from any such books.

Respectfully submitted,

PARK C. WILSON,
October 15th, 1881. *State Mine Inspector.*

REPORT

OF

MISS M. A. CLEAVES,

DELEGATE

TO THE

National Conference of Charities and Correction,

AND THE

NATIONAL ASSOCIATION FOR THE PROTECTION OF THE INSANE AND THE PREVENTION OF INSANITY,

HELD AT

CLEVELAND, OHIO,

JUNE AND JULY, 1880.

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1882.

REPORT.

To His Excellency John H. Gear, Governor of the State of Iowa:

Dear Sir: I have the honor herewith to transmit to you my report, as State delegate to the recent meetings of "The National Conference of Charities and Correction," and "The National Association for the Protection of the Insane and the Prevention of Insanity;" both of which were held in the city of Cleveland, Ohio, June 29th and 30th, and July 1st and 2d, 1880.

A STATE BOARD OF CHARITIES.

The recommendation of the president of the conference, in his annual address, that a permanent statistical bureau should be established in every State, in order that the work may be more minutely and thoroughly done than the general census board does, seems to me a wise one. But it does not appear to be of so much importance in this State as the establishment of a State Board of Charities and Correction, which, from the very nature of its position and work, would be enabled to obtain this information intelligently and thoroughly; and which when in possession of it would be so situated as to consider and utilize it to the best possible advantage for the good of the State and her wards.

In the estimation of your delegate, there should be established, as speedily as possible, a State Board of Charities and Correction in Iowa, to whom should be intrusted all powers essential to the most efficient discharge of these important duties. Local Boards of Trustees, while familiar with the conditions and wants of their respective institutions, are illy calculated to advise intelligently even of the needs of the institution which they represent; because they have not that knowledge of the whole subject which will enable them to see the points of analogy and points of difference between their own and other institutions, and thus render them capable of making judicious recommendations and giving intelligent advice. Each of such Boards represents to the legislature or legislative committees its interests and needs as seen from a local standpoint, and as of paramount importance to those of any other institution. A Board of State Charities, having under supervision all the charitable, penal, and reformatory institutions of the State, would from their knowledge of the whole field be enabled to say intelligently just what each one needed and what was necessary to be done for their best interests.

I quote, as follows, from the address of the president of the conference and wish to add thereto my most cordial approval of the statement. "It is absolutely impossible for any legislature or any legislative committee to give that time and attention which is indispensable to wise legislation in regard to our public institutions, without the coöperation of a permanent Board of State Charities and Correction."

In order, therefore, that our legislative bodies may be advised intelligently concerning the needs of our dependent and criminal classes, and the best methods for their care, detention, and treatment, there is needed that "animating intelligence which comes from organized and systematic efforts by competent and informed persons." The additional expense, necessary to the establishment and support of such an organization, would eventually, in the estimation of your delegate, be more than met by the amount saved to the State through the wiser economy which would govern the expenditures for the support of our dependent and delinquent classes, as well as in the better methods of care and treatment which would obtain, and the better results consequent upon systematic and organized effort. Nine States have such boards at this time, viz, Massachusetts, New York, Rhode Island, Pennsylvania, Ohio, Illinois, Michigan, Wisconsin, and Kansas. While they are all working to the same general end, they are organized upon different plans, and I doubt if the organization of the board of any one State would in all respects be adapted to the wants of another. In Iowa, such a board must be organized upon a plan which will meet the wants of the State. It should have supervision over all the charitable, penal, and reformatory institutions of the State, as well as all the dependents and delinquents within its borders, whether in jails, poor-houses, or private houses All of these classes should be regarded as wards of the State and should be under her immediate supervision. The duties to be imposed upon these boards and the powers to be exercised by them are, as yet, an open question and must to a great extent be settled by the individual States themselves.

1st. One point, upon which experienced workers are agreed, is in regard to our penal system. We cannot but regard it as a relic of barbarism; and fully realize that it needs reconstruction from top to bottom. Prisons throughout the United States, with perhaps but half a dozen exceptions, are merely places for punishment; and, as a rule, they make men worse instead of better. Jails and station-houses are even worse, perhaps, than prisons, and, instead of preventing or correcting crime, act as a continuing cause for it; the matter of jails and prisons is one that requires not only the attention of our philanthropists, but of the people as well. The aim of the State should not be punishment, only, for the criminal, and protection for the people; but reform for every individual capable of reformation. Every criminal reformed, no less every insane person cured, will, in the end, be a gain to the State and humanity. Prisoners should not be herded together. Convicted offenders should not be confined with the unconvicted, and old offenders should have no association with the young. Such laws should be enacted as would bring about this result; and, in the construction of new jails, provision should be made for the entire and absolute separation of all prisoners when deemed desirable. Under the present system all are herded together indiscriminately. The hardened offenders, with those guilty of their first criminal act; the depraved and vicious, with those who are simply weak and unfortunate; the old with the young; the guilty with the innocent; all are associated together, and every opportunity is offered for the moral corruption of all.

2d. The proper classification of those in jails is essential to their reclamation and future usefulness. All persons convicted of less than penitentiary offenses should be sent to work-houses, and compelled to earn their keeping by hard labor. All tramps, vagrants, and able-bodied paupers should be ranked as minor offenders, and promptly sent to the workhouse. In this State, where we have no large cities, the system of district work-houses would be suitable. It was the pleasure of your delegate to visit a work-house in the city of Cleveland, which by the labor of its inmates is rendered not only self-sustaining, but affords some revenue to the city. The industry maintained therein is the manufacture of brushes. If this class were by law compelled to earn their living by hard labor in district work-houses, instead of being furnished with boarding free of charge, as at present, their numbers would be diminished by causing them to acquire and practice habits of industry, and in the end a great saving to the State would be effected. It seems, to your delegate, that it was said with great pertinence, concerning penitentiaries, that they discharge prisoners worse in character and more dangerous to society than when they received them. Such a state of affairs is wrong and should not be continued.

3d. We should remember that men inside of prison walls, like men outside, are intensely human. None are wholly bad, and none are wholly good. In short, we should remember that condemned criminals are men of like passions with ourselves, and that fair, just, and equitable treatment is appreciated inside of prison walls just as fully as it is outside, and with the same result in making men better or worse. It is justice and not mercy that insists that a convict is fairly entitled to treatment according to conduct.

4th. All prisoners able to work should receive steady employment in occupations furnished by the State,rather than by contractors, and if unable to read and write they should be taught that much at least in a prison school.

5th. Prisoners, when discharged, should receive a certificate of good conduct if entitled to it, together with a percentage of their earnings, to give them a start. If their conduct has been bad, they should be carefully registered, and placed under supervision of the police, and be required to report at stated periods their location and occupation. To place the brand of Cain upon all alike—the good as well as the bad, is not only the height of cruelty, but also the height of folly.

6th. Our penitentiaries, to be what they ought to be, must have intelligent supervision, and all their officials should be specially trained for their work.

PREVENTION OF CRIME.

One other point upon which the conference and all experienced workers feel that too much stress cannot be laid, is the importance of prevention rather than cure.

By looking after the vagrant, homeless, vicious children, we may hope to accomplish the greatest good. A much larger percent, if taken when children and placed in industrial schools with proper training, may be saved from becoming criminals, than could possibly be reformed after entering upon a life of crime. No sin can be greater than that of allowing children to drift through our communities as homeless waifs, or to thrust them into poor-houses to be contaminated by their often vile and immoral surroundings. The law upon that point should be *must* and not "may;" and I trust that Iowa will look to it with an earnestness and speed that every child within her borders is removed from her poor-houses and placed in proper institutions for their care or in private homes. It is an extremely short-sighted policy to keep children in poor-houses because of the dollars and cents saved thereby. Instead of refining and elevating, such a home tends to deprave and demoralize and fit them for a life of dependence and crime.

PRIVATE HOMES FOR CHILDREN.

Nor is it the best policy to keep children continually in institutions for that purpose. The effects of institution life are, it seems to me, hurtful in the extreme for the individual. The policy should be to find suitable homes for all dependent children, from time to time, where they will have proper training and the beneficial influences of home life. If New York is able in one part to find homes in Iowa for more than one hundred of her homeless children, I fail to see why Iowa herself cannot provide similar homes within her own borders for her own destitute children who are scattered throughout the poor-houses or are kept in institutions at the State expense. Certainly, in this case, charity should begin at home, and the first duty of the State should be to place her own destitute children in the childless homes of the State. Then, if there is room, let her doors be opened to the children abroad. For those who have to be kept in institutions, whether in the Orphans'

Home or in our Reform Schools, the home life should be approximated as nearly as possible and the inmates should be taught all domestic occupations as well as such industrial pursuits as can be taught therein. The care of the neglected and dependent children is the most important of all the questions submitted to the consideration of the philanthropist. "If society should do its duty in this regard, it would not sleep until every one of its homeless and neglected children was taken out of the pollutions of poor-houses and out of the cities, and placed under the fostering care and in the genial sunshine of a Christian home." And more than this I would say that we should not rest until a home is found for every child that is a ward of the State.

THE INSANE.

Ere taking up for consideration the special subject of insanity and the insane, your delegate deems it wise to embody in this report the following propositions which were submitted to the conference, by the president in his address, and which are so pertinent as to demand expression and indorsement herein.

1st. The insane, the epileptic, and the idiotic should be wholly under State care, and not one of them should be left in a county or city pocr-house.

2d. The insane should be so classified and subdivided that the ordinary insane, the epileptic insane, and the convict insane should be entirely separated, and in the larger States each class should be provided for in an institution of its own.

3d. The idiotic and imbecile should be provided for not only in educational, but also in custodial, institutions under one administration. If we are to control the increase of idiocy custodial care is indispensable.

4th. Almshouses should be strictly limited to the care of such as are entirely unable to earn a living for themselves. Able bodied paupers should be sent to the work-house. The almshouse should be a refuge for the old, the sick, the lame, the halt, and the blind who have no other shelter, and to the worthy it should be made cheerful, comfortable, and hospitable.

Hospitals for the insane have been made to accommodate too many patients and built with an eye to the use of future generations rather than the present, and not to individual wants and needs, nor with any idea of approximating the home life. Many insane persons do not need any stronger or more enduring home than the average sane citizen.

That sane people are influenced by their surroundings is too self-evident a proposition to need demonstration. Insane nature does not differ materially from sane nature, only that a person weak, nervous, the subject of depression or excitement, as the case may be, with the balance not quite perfect, will be more readily affected by disturbing influences than the healthy, well balanced mind. In order that our hospitals should be such in the highest and best sense of the word, they should contain none but curable cases and they should have the supervision, care, and treatment of the best medical skill obtainable. They should be relieved of their prison-like features, and provided with all modern appliances for the treatment of disease. The policy of the State should be to remove the incurables from the hospitals to an asylum where they would still be under medical supervision. In this State we have two hospitals which have been constructed at great expense and are very well equipped for hospital purposes. Under these circumstances, it would not be wise, perhaps, to convert them into asylums for the incurable insane, although, in the opinion of your delegate, it would in the end be the better economy. Hospitals for curable cases ought not to contain more than a hundred patients in order that they may receive both the proper medical and personal attention. Fifty is a sufficiently large number to be under the care of any one physician. The hospitals which we have, however, are of greater capacity, and it only remains to make the best of them. The best policy for this State, it seems to your delegate, is to keep our present hospital buildings for *hospital* use alone. They are made at present to accommodate a number greatly in excess of their capacity. This should not be. If devoted to curative purposes two hundred will be a sufficient number for Mt. Pleasant and three hundred for Independence. If the incurable cases were removed from the hospitals there would not need to be more than the above estimate present at any one time. The incurables should be provided for not in the poor-houses, jails, or even in county asylums connected with poor-houses, but rather in district asylums or in a central State asylum. Under the circumstances, the best plan, perhaps, would be to secure a large farm centrally located, well watered and timbered, near a good market, and erect thereon a central or administrative building and detached buildings to accommodate the present number of the incurables, none of which structures should have a capacity to exceed one hundred and preferably a smaller number, at a cost in accord with the spirit not only of modern economy, but with the best interests of the chronic insane as well. They should not cost more than from two hundred and fifty to four hundred dollars per capita for shelter. Provision need not necessarily be made for all the incurable insane at once, as the expense would necessarily be great; but the policy should be to provide for the erection of these detached buildings from time to time as they are needed, or as the State can incur the expense.

Especially for the incurable, employment in the open air, when practicable, with a good, generous diet, will do more good than all the drugs in materia medica. It is a fact, well known to all, that enforced idleness is the worst calamity which can befall a human being. It is just as true of the insane as of the sane. The unoccupied mind has naught to do but to turn inward and feed upon itself. Morbid fancies are brooded upon until they become fixed. Delusions are indulged in by silent, contemplative introspection, until they in turn are fixed. Violent, destructive, and uncontrollable conduct has every opportunity to display itself, when the individual is unoccupied and left to follow his own sweet will.

Discontent would be less rude; and faces, now almost devoid of intelligence, would, under the happy influences of employment, fresh air, and sunshine, brighten materially. These views are not, as they may seem at first thought, utopian. The experiment of labor and a greater degree of freedom has been tried with marked success.

The reason why the non-restraint system succeeds in Great Britain, and on the continent, is because the insane are given work to do. Of much greater effect than either mechanical, manual, or medicinal restraint is the indirect restraining power of occupation.

A greater degree of liberty could and should be allowed insane persons than now obtained. Deprivation of liberty, while necessary in many instances, is not necessary in all; and the seclusion and restraint of a hospital, while wise for one, may be most unwise for another.

Our commissioners of insanity should be a body of *medical* persons, and should exercise discretionary powers in regard to the commitment of those brought before them.

While it is necessary to remove many from their homes and familiar surroundings, many others should never be sent to hospitals; but should be treated at their own homes, or in some instances, where change of scene is demanded, in private homes elsewhere.

The business management of the institutions shouid be placed in the hands of a third party, a steward. The physician should not have to spend time, which ought to be devoted to the medical care of the patients, to the work of an *architect*, *civil engineer*, *farmer*, *steward*, or the like. All such duties should be entirely removed from their hands. They should not, in hospitals for curable cases, have so many patients but that they can see each one of them every day, and have time to examine each case thoroughly as is done by physicians in private practice.

A hasty salutation should be replaced by a minute and intelligent examination of every organ and function. The difficulties besetting physicians to the insane are greater than those of the phyiscian in ordinary practice; and presumably more time should be given by the former to their patients than by the latter.

These things can and must be, if we hope to escape in any degree, the Scylla and Charybdis which beset the road to success.

Physicians in charge of the insane, as well as the general practitioner, should do all they can toward the prevention of mental disease by teaching the public the laws of health and the danger of tresspassing upon them.

NATIONAL ASSOCIATION.

During the session of the conference there was organized a "National Association for the Protection of the Insane and the Prevention of Insanity." Your delegate attended the meeting as representative from Iowa, in accordance with the commission received from your excellency.

The National Association numbers among its officers and members some of the best known physicians and philanthropists throughout the country.

The following are stated to be the Society's methods for attaining the end expressed in its name.

"1st. By the encouragement of special and thorough clinical and pathological observations by the medical profession generally, as well as those connected with asylums.

"2d. By enlightening public sentiment as to the nature of the malady, importance of early treatment, and improved methods of treatment at home and abroad.

"3d. By recommending an enlightened State policy, which, while neglecting no one of its insane population, shall so administer relief and protection as not to lay unnecessary or undue burdens upon the tax-payers.

"4th. By holding public meetings, wherever needed, to stimulate legislation that will secure efficient State supervision of all public institutions for the care of the insane, as a mutual safeguard for the protection of society—the patients, as well as those who have them in charge.

"5th. To further the perfection of laws relating to the treatment of the insane, and their rights while patients in the asylum.

"6th. By efforts to allay the public distrust in relation to the management of insane asylums, by placing them on the same footing as that of other hospitals, both in the matter of freer communication with the outside world, and the privilege of a consulting medical staff of general practitioners."

Your delegate is in thorough sympathy and accord with the object of this Association, and believes it is destined to be a great power for good in the United States, in preventing insanity, by its influence as an educative body, and in securing more rational and consequently more efficient care and treatment for the insane.

The Association adjourned to meet the last week in September, 1880, in the city of New York, for the purpose of perfecting their organization and entering upon their work.

The Conference adjourned to meet the last Monday of July, 1881, in the city of Boston.

Respectfully submitted,

M. A. CLEAVES.

Davenport, Iowa, August 10th, 1880.